Changes for the Better

MITSUBISHI ELECTRIC

MITSUBISHI CNC

PLC Interface Manual

M800/M80 Series

IB-1501272(ENG)-B

Introduction

This manual describes the various signal interfaces and functions required when creating MITSUBISHI CNC M800/M80 Series sequence programs (built-in PLC).
Read this manual thoroughly before programming. Thoroughly study the "Safety Precautions" on the following page to ensure safe use of this NC unit.

Details described in this manual

⚠ CAUTION

⚠ **For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine tool builder takes precedence over this manual.**

⚠ **Items that are not described in this manual must be interpreted as "not possible".**

⚠ **This manual is written on the assumption that all optional functions are added. Confirm the specifications issued by the machine tool builder before use.**

⚠ **Some screens and functions may differ or may not be usable depending on the NC version.**

Precautions for Safety

Always read the specifications issued by the machine maker, this manual, related manuals and attached documents before installation, operation, programming, maintenance or inspection to ensure correct use. Understand this numerical controller, safety items and cautions before using the unit.This manual ranks the safety precautions into "DANGER", "WARNING" and "CAUTION".

⚠ **DANGER** **When the user could be subject to imminent fatalities or major injuries if handling is mistaken.**
⚠ **WARNING** **When the user could be subject to fatalities or major injuries if handling is mistaken.**
⚠ **CAUTION** **When the user could be subject to minor or moderate injuries or the property could be damaged if handling is mistaken.**

Note that even items ranked as " ⚠ CAUTION", may lead to major results depending on the situation. In any case, important information that must always be observed is described.

The following sings indicate prohibition and compulsory.

⃠	**This sign indicates prohibited behavior (must not do).** **For example, indicates "Keep fire away".**
●	**This sign indicated a thing that is pompously (must do).** **For example, indicates "it must be grounded".**

The meaning of each pictorial sing is as follows.

 CAUTION	 **CAUTION rotated object**	 **CAUTION HOT**	 **Danger Electric shock risk**	 **Danger explosive**
 Prohibited	 **Disassembly is prohibited**	 **KEEP FIRE AWAY**	 **General instruction**	 **Earth ground**

For Safe Use

Mitsubishi CNC is designed and manufactured solely for applications to machine tools to be used for industrial purposes.
Do not use this product in any applications other than those specified above, especially those which are substantially influential on the public interest or which are expected to have significant influence on human lives or properties.

⚠ DANGER

There are no "Danger" items in this manual.

⚠ WARNING

1. Items related to prevention of electric shocks

⚠ **Do not operate the switches with wet hands, as this may lead to electric shocks.**

⚠ **Do not damage, apply excessive stress, place heavy things on or sandwich the cables, as this may lead to electric shocks.**

⚠ CAUTION

1. Items related to product and manual

⚠ **For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine tool builder takes precedence over this manual.**

⚠ **Items not described in this manual must be interpreted as "not possible".**

⚠ **This manual is written on the assumption that all optional functions are added. Confirm the specifications issued by the machine tool builder before use.**

⚠ **Some screens and functions may differ or may not be usable depending on the NC system version.**

2. Items related to connection

❗ **When using an inductive load such as relays, always contact a diode in parallel to the load as a noise measure.**

❗ **When using a capacitive load such as a lamp, always connect a protective resistor serially to the load to suppress rush currents.**

⚠ **Since the analog output R registers are allocated in ascending order of channels and station numbers, the analog output destination may change depending on added option.**

3. Items related to design

⚠ **Always turn the spindle phase synchronization completion signal ON before chucking both ends of the workpiece to the basic spindle and synchronous spindle. If the spindle phase synchronization signal is turned ON when both ends of the workpiece are chucked to the basic spindle and synchronous spindle, the chuck or workpiece could be damaged by the torsion that occurs during phase alignment.**

❗ **If the temperature rise detection function is invalidated with the parameters, the control could be disabled when the temperature is excessive. This could result in machine damage or personal injuries due to runaway axis, and could damage the device. Enable the detection function for normal use.**

Disposal

(Note) This symbol mark is for EU countries only.
This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.

Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and/or reused.
This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:
Hg: mercury (0,0005%), Cd: cadmium (0,002%), Pb: lead (0,004%)
In the European Union there are separate collection systems for used batteries and accumulators.
Please, dispose of batteries and accumulators correctly at your local community waste collection/ recycling centre.

Please, help us to conserve the environment we live in!

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Handling of our product

(English)
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

본 제품의 취급에 대해서

(한국어 /Korean)
이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며 가정외의 지역에서 사용하는 것을 목적으로 합니다 .

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1

List of Devices

1.1 List of Devices

Device	Device No.	Unit	Details
X*	X0 to X1FFF (8192 points)	1 bit	Input signal to PLC: Machine input, etc.
Y*	Y0 to Y1FFF (8192 points)	1 bit	Output signal from PLC: Machine output, etc.
M	M0 to M61439 (61440 points)	1 bit	Temporary memory
F	F0 to F2047 (2048 points)	1 bit	Temporary memory. Alarm message interface
L	L0 to L1023 (1024 points)	1 bit	Latch relay (back up memory)
SM	SM0 to SM2047 (2048 points)	1 bit	Special relay
V	V0 to V511 (512 points)	1 bit	Edge relay
SB	SB0 to SB3FF (1024points)	1 bit	Special relay
B	B0 to BDFFF (57344 points)	1 bit	Link relay
SW	SW0 to SW3FF (1024points)	1 bit	Special register
SD	SD0 to SD2047 (2048 points)	16 bit	Special register
T	T0 to T2047 (2048 points)	1 bit/16 bit	Timer (The variable/fixed boundary is set with a parameter.) (Note 2)
ST	ST0 to ST127 (128 points)	1 bit/16 bit	Integrated timer (100ms unit)
C	C0 to C511 (512 points)	1 bit/16 bit	Counter (The variable/fixed boundary is set with a parameter.)
D	D0 to D4095 (4096 points)	16 bit/32 bit	Data register. Register for calculation
R*	R0 to R32767 (32768 points)	16 bit/32 bit	File register. CNC word interface
ZR	ZR0 to ZR13311 (13312 points)	16 bit/32 bit	File register
W	W0 to W2FFF (12288 points)	16 bit/32 bit	Link register
Z	Z0 to Z13 (14 points)	16 bit	Address index
N	N0 to N14 (15 points)	-	Master controller nesting level
P*	P0 to P4095 (4096 points)	-	Label for conditional jump, subroutine call command
K	K-32768 to K32767	-	Decimal constant for 16-bit command
	K-2147483648 to K2147483647	-	Decimal constant for 32-bit command
H	H0 to HFFFF	-	Hexadecimal constant for 16-bit command
	H0 to HFFFFFFFF	-	Hexadecimal constant for 32-bit command

(Note 1) Devices marked with * in the device column have designated applications. Do not use devices other than those corresponding to the input/output signals with the machine side (input/output signals of the remote I/O unit), even if it is an undefined vacant device.

(Note 2) Distinction of 10ms timer and 100ms timer is performed by command.
(10ms timer is performed by OUTH command, 100ms timer is performed by OUT command.)

1.1.1 Device Range Setting at Multi-projects

Each device will be categorized to either the common device among projects (common device among projects) or the independent device for each projects (independent device among projects) when using the multi-project function.

(a) Common device among projects
Device is influenced by the access from the multiple projects.
The number of device points is fixed without being affected by the number of projects.
For example, the X/ Y/ R devices are common devices among projects.

(b) Independent device among projects
Device can be used independently in the multiple projects.
In addition, Independent device among projects are categorized into variable points or fixed points device.
- Independent device among projects (Fixed points)
  The number of device points is fixed without being affected by the number of projects.
  For example, the SM/ SD/ Z devices are independent devices among projects (fixed points)
- Independent device among projects (Variable points)
  The maximum number of project is allocated to each project and used.
  For example, the M/ L/ SB devices are independent devices among projects (variable points)

The list of device categories is as follows.

(1) Category explanation

Category	Details
Common	Common device among projects
Independent (fixed)	Independent device among projects (fixed points)
Independent (variable)	Independent device among projects (variable points)
Common/independent	Independent device among projects (variable points) However, it is possible to set as the common device among projects from the top.

(2) List of categories

Device	Category	Number of device points (Maximum number of projects)
X	Common	8192 points
Y	Common	8192 points
M	Common/Independent	61440 points (122880 points)
L	Independent(Variable)	1024 points (2048 points)
F	Common	2048 points
SB	Independent(Variable)	1024 points (2048 points)
B	Independent(Variable)	57344 points (114688 points)
SM	Independent(Fixed)	2048 points
V	Independent(Variable)	256 points (1024 points)
SW	Independent(Variable)	1024 points (2048 points)
SD	Independent(Fixed)	2048 points
T	Independent(Variable)	2048 points (4096 points)
ST	Independent(Variable)	128 points (256 points)
C	Independent(Variable)	512 points (1024 points)
D	Common/Independent	4096 points (8192 points)
R	Common	32768 points
ZR	Common	13312 points
W	Independent(Variable)	12288 points (24576 points)
Z	Independent(Fixed)	14 points
N	Independent(Fixed)	15 points
P	Independent(Fixed)	4096 points

* Number of points in brackets is for the options.

Refer to "PLC Programming Manual" for details on the independent device among projects and the common device among projects.

1.2 File Register General Map

Device	Details
R00000 to R00199	System common data (NC -> PLC)
R00200 to R00499	System common data (PLC -> NC)
R00500 to R00699	1st part system data (NC -> PLC)
R00700 to R00899	2nd part system data (NC -> PLC)
R00900 to R01099	3rd part system data (NC -> PLC)
R01100 to R01299	4th part system data (NC -> PLC)
R01300 to R02099	System reserve
R02100 to R02397	Pallet program data (Drive unit -> PLC)
R02500 to R02699	1st part system data (PLC -> NC)
R02700 to R02899	2nd part system data (PLC -> NC)
R02900 to R03099	3rd part system data (PLC -> NC)
R03100 to R03299	4th part system data (PLC -> NC)
R03300 to R04099	System reserve
R04100 to R04103	Pallet program data (PLC -> Drive unit)
R04104 to R04499	System reserve
R04500 to R05683	Axis data (NC -> PLC)
R05684 to R05699	System reserve
R05700 to R06371	Axis data (PLC -> NC)
R06372 to R06499	User macro (NC -> PLC: 64 point, PLC -> NC: 64 point)
R06500 to R06549	1st spindle data (NC -> PLC)
R06550 to R06599	2nd spindle data (NC -> PLC)
R06600 to R06649	3rd spindle data (NC -> PLC)
R06650 to R06699	4th spindle data (NC -> PLC)
R06700 to R06749	5th spindle data (NC -> PLC)
R06750 to R06799	6th spindle data (NC -> PLC)
R06800 to R06849	7th spindle data (NC -> PLC)
R06850 to R06899	8th spindle data (NC -> PLC)
R06900 to R06999	System reserve
R07000 to R07049	1st spindle data (PLC -> NC)
R07050 to R07099	2nd spindle data (PLC -> NC)
R07100 to R07149	3rd spindle data (PLC -> NC)
R07150 to R07199	4th spindle data (PLC -> NC)
R07200 to R07249	5th spindle data (PLC -> NC)
R07250 to R07299	6th spindle data (PLC -> NC)
R07300 to R07349	7th spindle data (PLC -> NC)
R07350 to R07399	8th spindle data (PLC -> NC)
R07400 to R07499	System reserve
R07500 to R07949	PLC constants
R07950 to R07999	System reserve
R08000 to R08099	PLC axis indexing
R08100 to R08289	System reserve
R08290 to R08299	Optimum acceleration/deceleration (Spindle)
R08300 to R09799	User backed up area
R09800 to R09899	User work area
R09900 to R09999	J2CT
R10000 to R10099	Remote I/O communication error information
R10100 to R10139	I/O link input
R10140 to R10179	I/O link output
R10180 to R10180	I/O link communication status
R10181 to R10187	System reserve
R10188 to R10189	Base PLC mounting check
R10190 to R10199	MELSEC link II diagnosis I/F

Device	Details
R10200 to R10399	Data buffer for MELSEC link II (machine input)
R10400 to R10599	Data buffer for MELSEC link II (machine output)
R10600 to R12759	ATC data, tool life management for M system / Tool life management I, II for L system
R12760 to R13999	System reserve
R14000 to R14499	EcoMonitorLight data (NC -> PLC)
R14500 to R17299	System reserve
R17300 to R18299	Modbus input/output device
R18300 to R19799	User backup area
R19800 to R19899	User work area
R19900 to R19999	System reserve
R20000 to R20199	System common data (NC -> PLC)
R20200 to R20499	System common data (PLC -> NC)
R20500 to R20699	1st part system data (NC -> PLC)
R20700 to R20899	2nd part system data (NC -> PLC)
R20900 to R21099	3rd part system data (NC -> PLC)
R21100 to R21299	4th part system data (NC -> PLC)
R21300 to R22499	System reserve
R22500 to R22699	1st part system data (PLC -> NC)
R22700 to R22899	2nd part system data (PLC -> NC)
R22900 to R23099	3rd part system data (PLC -> NC)
R23100 to R23299	4th part system data (PLC -> NC)
R23300 to R28299	System reserve
R28300 to R29799	User backup area
R29800 to R29899	User work area
R29900 to R32767	System reserve

(Note) The system reserve is used for function expansion by Mitsubishi, and must not be used by the user.

2

Input/Output Signals with Controller

Types of Input/Output Signals Tables

The followings are the types of input/output signals tables to be used.

For common devices used in part systems (Sample)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X720			X728		
X721			X729		
X722		Diagnosis data output completio	X72A		
X723		Collecting diagnosis data	X72B		
X724		In remote program input ▲	X72C		
X725		Remote program input completion▲	X72D		
X726		Remote program input error ▲	X72E		
X727		In tool ID communication ▲	X72F		Power OFF required after parameter change

For devices used in each part system (Sample)

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y7A0	Y7A8	Y7B0	Y7B8	*SVF1	Servo OFF 1st axis
Y7A1	Y7A9	Y7B1	Y7B9	*SVF2	2st axis
Y7A2	Y7AA	Y7B2	Y7BA	*SVF3	3st axis
Y7A3	Y7AB	Y7B3	Y7BB	*SVF4	4st axis
Y7A4	Y7AC	Y7B4	Y7BC	*SVF5	5st axis
Y7A5	Y7AD	Y7B5	Y7BD	*SVF6	6st axis
Y7A6	Y7AE	Y7B6	Y7BE	*SVF7	7st axis
Y7A7	Y7AF	Y7B7	Y7BF	*SVF8	8st axis

For devices used in each spindle (Sample)

Device No.							
1stSP	2stSP	3stSP	4stSP	5stSP	6stSP	Abbrev.	Signal name
R6500	R6550	R6600	R6650	R6700	R6750		Spindle command rotation speed input (L)
R6501	R6551	R6601	R6651	R6701	R6751		(H)
R6502	R6552	R6602	R6652	R6702	R6752		Spindle command final data (rotation speed) (L)
R6503	R6553	R6603	R6653	R6703	R6753		(H)
R6504	R6554	R6604	R6654	R6704	R6754		Spindle command final data (12-bit binary) (L)
R6505	R6555	R6605	R6655	R6705	R6755		(H)
R6506	R6556	R6606	R6656	R6706	R6756		Spindle actual speed (L)
R6507	R6557	R6607	R6657	R6707	R6757		(H)

(Note 1) Signals marked with "*" in the "Abbrev." column are handled as B contacts.

(Note 2) Signals marked with " ▲ " are prepared for a specific machine tool builder.

(Note 3) Unit is changed by "#1040 M_inch" for the signals marked with [M].

(Note 4) 32bit signals are shown with (L)/(H), which indicates Low/High order. Data structure and the descriptions are as follows.

Classification of Input/Output Signals with Controller

There are 1-bit unit, and 16-bit or 32-bit unit controller input/output signals, which are classified as shown below. When designing, refer to the section indicated below and make allocations according to the table in the respective section.

"$" and "SP" in "Device No." column stand for "part system" and "spindle" respectively.

	Signal type	Explanation	Reference
Input	DI	(1) Allocated to device X. (2) Data calculated in bit units are allocated as a principle. (3) Signals with only $1 or 1stSP section filled are common for all part systems or all spindles.	"PLC Input Signals (Bit Type: X***)"
	Data	(1) Allocated to device R. (2) Data handled in 16-bit or 32-bit units is allocated as a principle.	"PLC Input Signals (Data Type: R***)"
Output	DO	(1) Allocated to device Y. (2) Data calculated in bit units are allocated as a principle. (3) Signals with only $1 or 1stSP section filled are common for all part systems or all spindles.	"PLC Output Signals (Bit Type: Y***)"
	Data	(1) Allocated to device R. (2) Data handled in 16-bit or 32-bit units is allocated as a principle.	"PLC Output Signals (Data Type: R***)"
Others	Special relay/ register	(1) Allocated to device SM, SB and SW. (2) The sequence instruction calculation state, results and the signals with special operations are allocated.	"Explanation of Special Relays/Register"
	ZR	(1) Allocated to device ZR. (2) Use in the smart safety observation function.	"ZR device"
	Classified under purpose	Devices are classified under the usage purpose.	"Explanations for Each Application"

2.1 PLC Input Signals (Bit type: X***)

(Note) Signals with " ▲ " are prepared for specific machine tool builders.

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X2F0	BRST	Board reset			

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X700	IPCEI1	Power consumption computation: Consumption accumulation ON 1	X708	IPCCC1	Power consumption computation: Clearing consumption accumulation 1 complete
X701	IPCEI2	Power consumption computation: Consumption accumulation ON 2	X709	IPCCC2	Power consumption computation: Clearing consumption accumulation 2 complete
X702	IPCEI3	Power consumption computation: Consumption accumulation ON 3	X70A	IPCCC3	Power consumption computation: Clearing consumption accumulation 3 complete
X703	IPCEI4	Power consumption computation: Consumption accumulation ON 4	X70B	IPCCC4	Power consumption computation: Clearing consumption accumulation 4 complete
X704			X70C		
X705			X70D		
X706			X70E	BATWR	Battery warning
X707		Power OFF processing	X70F	BATAL	Battery alarm

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X710			X718		
X711		Optimum acceleration/deceleration switching parameter completion [spindle] ▲	X719		
X712	SMLKO	High-speed simple program check mode ON	X71A		
X713	SPSCO	High-speed simple program check: Coordinate position check ON	X71B		
X714			X71C		
X715	PCHKO	Manual arbitrary reverse run mode ON	X71D		
X716	MOREV	Manual arbitrary reverse run: Reverse run ON	X71E		
X717			X71F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X720		In sampling trace ▲	X728	MDBUSIF	Modbus/TCP communicating ▲
X721		Sampling trace complete ▲	X729	MDBUSER1	Modbus time-out 1 ▲
X722		Diagnosis data output completion	X72A	MDBUSER2	Modbus time-out 2 ▲
X723		Collecting diagnosis data	X72B	FLNETO	FL-net : Online ▲
X724		In remote program input ▲	X72C		
X725		Remote program input completion ▲	X72D		
X726		Remote program input error ▲	X72E		
X727		In tool ID communication ▲	X72F		Power OFF required after parameter change

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X730			X738		
X731			X739		
X732			X73A		
X733			X73B		
X734			X73C		
X735			X73D		
X736			X73E		
X737			X73F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X740			X748		
X741			X749		
X742			X74A		
X743			X74B		
X744			X74C		
X745			X74D	MBSTP	Thread, tap block stopping in manual arbitrary reverse run
X746			X74E	MRVNG	Thread, tap reverse run prohibition alarm in manual arbitrary reverse run
X747			X74F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X750			X758		Pallet program registration Ext. workpiece coordinate transfer completion
X751			X759		
X752	CNOP	24 hours continuous operation	X75A		
X753	MSOE	In multi-step speed monitor ▲	X75B		
X754			X75C		
X755			X75D		
X756			X75E		
X757			X75F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X760		$1 Display	X768		
X761		$2 Display	X769		
X762		$3 Display	X76A		
X763		$4 Display	X76B		
X764		$5 Display	X76C		
X765		$6 Display	X76D		
X766		$7 Display	X76E		
X767		$8 Display	X76F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X770			X778	GBMOD	G/B spindle synchronizing mode
X771			X779	GBSYN	G/B spindle synchronization: position control synchronizing
X772			X77A	GBPHF	G/B spindle synchronization: phase alignment complete
X773			X77B	GBPCM	G/B spindle synchronization: position error compensating
X774			X77C		
X775			X77D		
X776			X77E		
X777			X77F		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X780	X788	X790	X798	RDY1	Servo ready 1st axis
X781	X789	X791	X799	RDY2	Servo ready 2nd axis
X782	X78A	X792	X79A	RDY3	Servo ready 3rd axis
X783	X78B	X793	X79B	RDY4	Servo ready 4th axis
X784	X78C	X794	X79C	RDY5	Servo ready 5th axis
X785	X78D	X795	X79D	RDY6	Servo ready 6th axis
X786	X78E	X796	X79E	RDY7	Servo ready 7th axis
X787	X78F	X797	X79F	RDY8	Servo ready 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X7A0	X7A8	X7B0	X7B8	AX1	Axis selection 1st axis
X7A1	X7A9	X7B1	X7B9	AX2	Axis selection 2nd axis
X7A2	X7AA	X7B2	X7BA	AX3	Axis selection 3rd axis
X7A3	X7AB	X7B3	X7BB	AX4	Axis selection 4th axis
X7A4	X7AC	X7B4	X7BC	AX5	Axis selection 5th axis
X7A5	X7AD	X7B5	X7BD	AX6	Axis selection 6th axis
X7A6	X7AE	X7B6	X7BE	AX7	Axis selection 7th axis
X7A7	X7AF	X7B7	X7BF	AX8	Axis selection 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X7C0	X7C8	X7D0	X7D8	MVP1	In axis plus motion 1st axis
X7C1	X7C9	X7D1	X7D9	MVP2	In axis plus motion 2nd axis
X7C2	X7CA	X7D2	X7DA	MVP3	In axis plus motion 3rd axis
X7C3	X7CB	X7D3	X7DB	MVP4	In axis plus motion 4th axis
X7C4	X7CC	X7D4	X7DC	MVP5	In axis plus motion 5th axis
X7C5	X7CD	X7D5	X7DD	MVP6	In axis plus motion 6th axis
X7C6	X7CE	X7D6	X7DE	MVP7	In axis plus motion 7th axis
X7C7	X7CF	X7D7	X7DF	MVP8	In axis plus motion 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X7E0	X7E8	X7F0	X7F8	MVM1	In axis minus motion 1st axis
X7E1	X7E9	X7F1	X7F9	MVM2	In axis minus motion 2nd axis
X7E2	X7EA	X7F2	X7FA	MVM3	In axis minus motion 3rd axis
X7E3	X7EB	X7F3	X7FB	MVM4	In axis minus motion 4th axis
X7E4	X7EC	X7F4	X7FC	MVM5	In axis minus motion 5th axis
X7E5	X7ED	X7F5	X7FD	MVM6	In axis minus motion 6th axis
X7E6	X7EE	X7F6	X7FE	MVM7	In axis minus motion 7th axis
X7E7	X7EF	X7F7	X7FF	MVM8	In axis minus motion 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X800	X808	X810	X818	ZP11	1st reference position reached 1st axis
X801	X809	X811	X819	ZP12	1st reference position reached 2nd axis
X802	X80A	X812	X81A	ZP13	1st reference position reached 3rd axis
X803	X80B	X813	X81B	ZP14	1st reference position reached 4th axis
X804	X80C	X814	X81C	ZP15	1st reference position reached 5th axis
X805	X80D	X815	X81D	ZP16	1st reference position reached 6th axis
X806	X80E	X816	X81E	ZP17	1st reference position reached 7th axis
X807	X80F	X817	X81F	ZP18	1st reference position reached 8th axis
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X820	X828	X830	X838	ZP21	2nd reference position reached 1st axis
X821	X829	X831	X839	ZP22	2nd reference position reached 2nd axis
X822	X82A	X832	X83A	ZP23	2nd reference position reached 3rd axis
X823	X82B	X833	X83B	ZP24	2nd reference position reached 4th axis
X824	X82C	X834	X83C	ZP25	2nd reference position reached 5th axis
X825	X82D	X835	X83D	ZP26	2nd reference position reached 6th axis
X826	X82E	X836	X83E	ZP27	2nd reference position reached 7th axis
X827	X82F	X837	X83F	ZP28	2nd reference position reached 8th axis
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X840	X848	X850	X858	ZP31	3rd reference position reached 1st axis
X841	X849	X851	X859	ZP32	3rd reference position reached 2nd axis
X842	X84A	X852	X85A	ZP33	3rd reference position reached 3rd axis
X843	X84B	X853	X85B	ZP34	3rd reference position reached 4th axis
X844	X84C	X854	X85C	ZP35	3rd reference position reached 5th axis
X845	X84D	X855	X85D	ZP36	3rd reference position reached 6th axis
X846	X84E	X856	X85E	ZP37	3rd reference position reached 7th axis
X847	X84F	X857	X85F	ZP38	3rd reference position reached 8th axis
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X860	X868	X870	X878	ZP41	4th reference position reached 1st axis
X861	X869	X871	X879	ZP42	4th reference position reached 2nd axis
X862	X86A	X872	X87A	ZP43	4th reference position reached 3rd axis
X863	X86B	X873	X87B	ZP44	4th reference position reached 4th axis
X864	X86C	X874	X87C	ZP45	4th reference position reached 5th axis
X865	X86D	X875	X87D	ZP46	4th reference position reached 6th axis
X866	X86E	X876	X87E	ZP47	4th reference position reached 7th axis
X867	X86F	X877	X87F	ZP48	4th reference position reached 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X880	X888	X890	X898	NRF1	Near reference position 1st axis
X881	X889	X891	X899	NRF2	Near reference position 2nd axis
X882	X88A	X892	X89A	NRF3	Near reference position 3rd axis
X883	X88B	X893	X89B	NRF4	Near reference position 4th axis
X884	X88C	X894	X89C	NRF5	Near reference position 5th axis
X885	X88D	X895	X89D	NRF6	Near reference position 6th axis
X886	X88E	X896	X89E	NRF7	Near reference position 7th axis
X887	X88F	X897	X89F	NRF8	Near reference position 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X8A0	X8A8	X8B0	X8B8	PLFN1	Arbitrary axis superimposition complete 1st axis
X8A1	X8A9	X8B1	X8B9	PLFN2	Arbitrary axis superimposition complete 2nd axis
X8A2	X8AA	X8B2	X8BA	PLFN3	Arbitrary axis superimposition complete 3rd axis
X8A3	X8AB	X8B3	X8BB	PLFN4	Arbitrary axis superimposition complete 4th axis
X8A4	X8AC	X8B4	X8BC	PLFN5	Arbitrary axis superimposition complete 5th axis
X8A5	X8AD	X8B5	X8BD	PLFN6	Arbitrary axis superimposition complete 6th axis
X8A6	X8AE	X8B6	X8BE	PLFN7	Arbitrary axis superimposition complete 7th axis
X8A7	X8AF	X8B7	X8BF	PLFN8	Arbitrary axis superimposition complete 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X8C0	X8C8	X8D0	X8D8	ZSF1	Zero point initialization set completed 1st axis
X8C1	X8C9	X8D1	X8D9	ZSF2	Zero point initialization set completed 2nd axis
X8C2	X8CA	X8D2	X8DA	ZSF3	Zero point initialization set completed 3rd axis
X8C3	X8CB	X8D3	X8DB	ZSF4	Zero point initialization set completed 4th axis
X8C4	X8CC	X8D4	X8DC	ZSF5	Zero point initialization set completed 5th axis
X8C5	X8CD	X8D5	X8DD	ZSF6	Zero point initialization set completed 6th axis
X8C6	X8CE	X8D6	X8DE	ZSF7	Zero point initialization set completed 7th axis
X8C7	X8CF	X8D7	X8DF	ZSF8	Zero point initialization set completed 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X8E0	X8E8	X8F0	X8F8	ZSE1	Zero point initialization set error completed 1st axis
X8E1	X8E9	X8F1	X8F9	ZSE2	Zero point initialization set error completed 2nd axis
X8E2	X8EA	X8F2	X8FA	ZSE3	Zero point initialization set error completed 3rd axis
X8E3	X8EB	X8F3	X8FB	ZSE4	Zero point initialization set error completed 4th axis
X8E4	X8EC	X8F4	X8FC	ZSE5	Zero point initialization set error completed 5th axis
X8E5	X8ED	X8F5	X8FD	ZSE6	Zero point initialization set error completed 6th axis
X8E6	X8EE	X8F6	X8FE	ZSE7	Zero point initialization set error completed 7th axis
X8E7	X8EF	X8F7	X8FF	ZSE8	Zero point initialization set error completed 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X900	X908	X910	X918	ILI1	In current limit 1st axis
X901	X909	X911	X919	ILI2	In current limit 2nd axis
X902	X90A	X912	X91A	ILI3	In current limit 3rd axis
X903	X90B	X913	X91B	ILI4	In current limit 4th axis
X904	X90C	X914	X91C	ILI5	In current limit 5th axis
X905	X90D	X915	X91D	ILI6	In current limit 6th axis
X906	X90E	X916	X91E	ILI7	In current limit 7th axis
X907	X90F	X917	X91F	ILI8	In current limit 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X920	X928	X930	X938	ILA1	Current limit reached 1st axis
X921	X929	X931	X939	ILA2	Current limit reached 2nd axis
X922	X92A	X932	X93A	ILA3	Current limit reached 3rd axis
X923	X92B	X933	X93B	ILA4	Current limit reached 4th axis
X924	X92C	X934	X93C	ILA5	Current limit reached 5th axis
X925	X92D	X935	X93D	ILA6	Current limit reached 6th axis
X926	X92E	X936	X93E	ILA7	Current limit reached 7th axis
X927	X92F	X937	X93F	ILA8	Current limit reached 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X940	X948	X950	X958	ARRF1	NC axis up-to-speed 1st axis
X941	X949	X951	X959	ARRF2	NC axis up-to-speed 2nd axis
X942	X94A	X952	X95A	ARRF3	NC axis up-to-speed 3rd axis
X943	X94B	X953	X95B	ARRF4	NC axis up-to-speed 4th axis
X944	X94C	X954	X95C	ARRF5	NC axis up-to-speed 5th axis
X945	X94D	X955	X95D	ARRF6	NC axis up-to-speed 6th axis
X946	X94E	X956	X95E	ARRF7	NC axis up-to-speed 7th axis
X947	X94F	X957	X95F	ARRF8	NC axis up-to-speed 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X960	X968	X970	X978	UCLP1	Unclamp command 1st axis
X961	X969	X971	X979	UCLP2	Unclamp command 2nd axis
X962	X96A	X972	X97A	UCLP3	Unclamp command 3rd axis
X963	X96B	X973	X97B	UCLP4	Unclamp command 4th axis
X964	X96C	X974	X97C	UCLP5	Unclamp command 5th axis
X965	X96D	X975	X97D	UCLP6	Unclamp command 6th axis
X966	X96E	X976	X97E	UCLP7	Unclamp command 7th axis
X967	X96F	X977	X97F	UCLP8	Unclamp command 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X980	X988	X990	X998		In mixed control (cross axis control) 1st axis
X981	X989	X991	X999		In mixed control (cross axis control) 2nd axis
X982	X98A	X992	X99A		In mixed control (cross axis control) 3rd axis
X983	X98B	X993	X99B		In mixed control (cross axis control) 4th axis
X984	X98C	X994	X99C		In mixed control (cross axis control) 5th axis
X985	X98D	X995	X99D		In mixed control (cross axis control) 6th axis
X986	X98E	X996	X99E		In mixed control (cross axis control) 7th axis
X987	X98F	X997	X99F		In mixed control (cross axis control) 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X9A0	X9A8	X9B0	X9B8		In synchronous/superimposition control 1st axis
X9A1	X9A9	X9B1	X9B9		In synchronous/superimposition control 2nd axis
X9A2	X9AA	X9B2	X9BA		In synchronous/superimposition control 3rd axis
X9A3	X9AB	X9B3	X9BB		In synchronous/superimposition control 4th axis
X9A4	X9AC	X9B4	X9BC		In synchronous/superimposition control 5th axis
X9A5	X9AD	X9B5	X9BD		In synchronous/superimposition control 6th axis
X9A6	X9AE	X9B6	X9BE		In synchronous/superimposition control 7th axis
X9A7	X9AF	X9B7	X9BF		In synchronous/superimposition control 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X9C0	X9C8	X9D0	X9D8	MIR1	In mirror image 1st axis
X9C1	X9C9	X9D1	X9D9	MIR2	In mirror image 2nd axis
X9C2	X9CA	X9D2	X9DA	MIR3	In mirror image 3rd axis
X9C3	X9CB	X9D3	X9DB	MIR4	In mirror image 4th axis
X9C4	X9CC	X9D4	X9DC	MIR5	In mirror image 5th axis
X9C5	X9CD	X9D5	X9DD	MIR6	In mirror image 6th axis
X9C6	X9CE	X9D6	X9DE	MIR7	In mirror image 7th axis
X9C7	X9CF	X9D7	X9DF	MIR8	In mirror image 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
X9E0	X9E8	X9F0	X9F8		Reference position establishment 1st axis
X9E1	X9E9	X9F1	X9F9		Reference position establishment 2nd axis
X9E2	X9EA	X9F2	X9FA		Reference position establishment 3rd axis
X9E3	X9EB	X9F3	X9FB		Reference position establishment 4th axis
X9E4	X9EC	X9F4	X9FC		Reference position establishment 5th axis
X9E5	X9ED	X9F5	X9FD		Reference position establishment 6th axis
X9E6	X9EE	X9F6	X9FE		Reference position establishment 7th axis
X9E7	X9EF	X9F7	X9FF		Reference position establishment 8th axis
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XA00	XA08	XA10	XA18		Reference position return direction 1st axis
XA01	XA09	XA11	XA19		Reference position return direction 2nd axis
XA02	XA0A	XA12	XA1A		Reference position return direction 3rd axis
XA03	XA0B	XA13	XA1B		Reference position return direction 4th axis
XA04	XA0C	XA14	XA1C		Reference position return direction 5th axis
XA05	XA0D	XA15	XA1D		Reference position return direction 6th axis
XA06	XA0E	XA16	XA1E		Reference position return direction 7th axis
XA07	XA0F	XA17	XA1F		Reference position return direction 8th axis
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XA20	XA28	XA30	XA38		In NC axis control 1st axis
XA21	XA29	XA31	XA39		In NC axis control 2nd axis
XA22	XA2A	XA32	XA3A		In NC axis control 3rd axis
XA23	XA2B	XA33	XA3B		In NC axis control 4th axis
XA24	XA2C	XA34	XA3C		In NC axis control 5th axis
XA25	XA2D	XA35	XA3D		In NC axis control 6th axis
XA26	XA2E	XA36	XA3E		In NC axis control 7th axis
XA27	XA2F	XA37	XA3F		In NC axis control 8th axis
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XA40	XA48	XA50	XA58	ECIL1	Ext. machine coordinate system offset data illegal 1st axis
XA41	XA49	XA51	XA59	ECIL2	Ext. machine coordinate system offset data illegal 2nd axis
XA42	XA4A	XA52	XA5A	ECIL3	Ext. machine coordinate system offset data illegal 3rd axis
XA43	XA4B	XA53	XA5B	ECIL4	Ext. machine coordinate system offset data illegal 4th axis
XA44	XA4C	XA54	XA5C	ECIL5	Ext. machine coordinate system offset data illegal 5th axis
XA45	XA4D	XA55	XA5D	ECIL6	Ext. machine coordinate system offset data illegal 6th axis
XA46	XA4E	XA56	XA5E	ECIL7	Ext. machine coordinate system offset data illegal 7th axis
XA47	XA4F	XA57	XA5F	ECIL8	Ext. machine coordinate system offset data illegal 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XA60	XA68	XA70	XA78		Vertical axis pull-up prevented 1st axis
XA61	XA69	XA71	XA79		Vertical axis pull-up prevented 2nd axis
XA62	XA6A	XA72	XA7A		Vertical axis pull-up prevented 3rd axis
XA63	XA6B	XA73	XA7B		Vertical axis pull-up prevented 4th axis
XA64	XA6C	XA74	XA7C		Vertical axis pull-up prevented 5th axis
XA65	XA6D	XA75	XA7D		Vertical axis pull-up prevented 6th axis
XA66	XA6E	XA76	XA7E		Vertical axis pull-up prevented 7th axis
XA67	XA6F	XA77	XA7F		Vertical axis pull-up prevented 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XA80	XA88	XA90	XA98		Mirror image status 1st axis ▲
XA81	XA89	XA91	XA99		Mirror image status 2nd axis ▲
XA82	XA8A	XA92	XA9A		Mirror image status 3rd axis ▲
XA83	XA8B	XA93	XA9B		Mirror image status 4th axis ▲
XA84	XA8C	XA94	XA9C		Mirror image status 5th axis ▲
XA85	XA8D	XA95	XA9D		Mirror image status 6th axis ▲
XA86	XA8E	XA96	XA9E		Mirror image status 7th axis ▲
XA87	XA8F	XA97	XA9F		Mirror image status 8th axis ▲

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XB00	XB08	XB10	XB18		Clamp command 1st axis ▲
XB01	XB09	XB11	XB19		Clamp command 2nd axis ▲
XB02	XB0A	XB12	XB1A		Clamp command 3rd axis ▲
XB03	XB0B	XB13	XB1B		Clamp command 4th axis ▲
XB04	XB0C	XB14	XB1C		Clamp command 5th axis ▲
XB05	XB0D	XB15	XB1D		Clamp command 6th axis ▲
XB06	XB0E	XB16	XB1E		Clamp command 7th axis ▲
XB07	XB0F	XB17	XB1F		Clamp command 8th axis ▲

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XB40	XB48	XB50	XB58	ROTSPM1	Spindle-mode rotary axis control mode 1st axis
XB41	XB49	XB51	XB59	ROTSPM2	Spindle-mode rotary axis control mode 2nd axis
XB42	XB4A	XB52	XB5A	ROTSPM3	Spindle-mode rotary axis control mode 3rd axis
XB43	XB4B	XB53	XB5B	ROTSPM4	Spindle-mode rotary axis control mode 4th axis
XB44	XB4C	XB54	XB5C	ROTSPM5	Spindle-mode rotary axis control mode 5th axis
XB45	XB4D	XB55	XB5D	ROTSPM6	Spindle-mode rotary axis control mode 6th axis
XB46	XB4E	XB56	XB5E	ROTSPM7	Spindle-mode rotary axis control mode 7th axis
XB47	XB4F	XB57	XB5F	ROTSPM8	Spindle-mode rotary axis control mode 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XB80	XB88	XB90	XB98	VGHLD1	Real-time tuning 1: Speed gain hold-down ON 1st axis
XB81	XB89	XB91	XB99	VGHLD2	Real-time tuning 1: Speed gain hold-down ON 2nd axis
XB82	XB8A	XB92	XB9A	VGHLD3	Real-time tuning 1: Speed gain hold-down ON 3rd axis
XB83	XB8B	XB93	XB9B	VGHLD4	Real-time tuning 1: Speed gain hold-down ON 4th axis
XB84	XB8C	XB94	XB9C	VGHLD5	Real-time tuning 1: Speed gain hold-down ON 5th axis
XB85	XB8D	XB95	XB9D	VGHLD6	Real-time tuning 1: Speed gain hold-down ON 6th axis
XB86	XB8E	XB96	XB9E	VGHLD7	Real-time tuning 1: Speed gain hold-down ON 7th axis
XB87	XB8F	XB97	XB9F	VGHLD8	Real-time tuning 1: Speed gain hold-down ON 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XBA0	XBA8	XBB0	XBB8		
XBA1	XBA9	XBB1	XBB9		
XBA2	XBAA	XBB2	XBBA		
XBA3	XBAB	XBB3	XBBB		
XBA4	XBAC	XBB4	XBBC		
XBA5	XBAD	XBB5	XBBD		
XBA6	XBAE	XBB6	XBBE		
XBA7	XBAF	XBB7	XBBF		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XBC0	XBC8	XBD0	XBD8		
XBC1	XBC9	XBD1	XBD9		
XBC2	XBCA	XBD2	XBDA		
XBC3	XBCB	XBD3	XBDB		
XBC4	XBCC	XBD4	XBDC		
XBC5	XBCD	XBD5	XBDD		
XBC6	XBCE	XBD6	XBDE		
XBC7	XBCF	XBD7	XBDF		

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
XBE0	XBE8	XBF0	XBF8	GQEMGO1	Machine group-based alarm stop: Machine group-based PLC interlock ON 1st axis
XBE1	XBE9	XBF1	XBF9	GQEMGO2	Machine group-based alarm stop: Machine group-based PLC interlock ON 2nd axis
XBE2	XBEA	XBF2	XBFA	GQEMGO3	Machine group-based alarm stop: Machine group-based PLC interlock ON 3rd axis
XBE3	XBEB	XBF3	XBFB	GQEMGO4	Machine group-based alarm stop: Machine group-based PLC interlock ON 4th axis
XBE4	XBEC	XBF4	XBFC	GQEMGO5	Machine group-based alarm stop: Machine group-based PLC interlock ON 5th axis
XBE5	XBED	XBF5	XBFD	GQEMGO6	Machine group-based alarm stop: Machine group-based PLC interlock ON 6th axis
XBE6	XBEE	XBF6	XBFE	GQEMGO7	Machine group-based alarm stop: Machine group-based PLC interlock ON 7th axis
XBE7	XBEF	XBF7	XBFF	GQEMGO8	Machine group-based alarm stop: Machine group-based PLC interlock ON 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC00	XD40	XE80	XFC0	X1100	X1240	X1380	X14C0	JO	In jog mode
XC01	XD41	XE81	XFC1	X1101	X1241	X1381	X14C1	HO	In handle mode
XC02	XD42	XE82	XFC2	X1102	X1242	X1382	X14C2	SO	In incremental mode
XC03	XD43	XE83	XFC3	X1103	X1243	X1383	X14C3	PTPO	In manual arbitrary feed mode
XC04	XD44	XE84	XFC4	X1104	X1244	X1384	X14C4	ZRNO	In reference position return mode
XC05	XD45	XE85	XFC5	X1105	X1245	X1385	X14C5	ASTO	In automatic initial set mode
XC06	XD46	XE86	XFC6	X1106	X1246	X1386	X14C6		In JOG-handle simultaneous mode
XC07	XD47	XE87	XFC7	X1107	X1247	X1387	X14C7		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC08	XD48	XE88	XFC8	X1108	X1248	X1388	X14C8	MEMO	In memory mode
XC09	XD49	XE89	XFC9	X1109	X1249	X1389	X14C9	TO	In tape mode
XC0A	XD4A	XE8A	XFCA	X110A	X124A	X138A	X14CA		In online operation mode
XC0B	XD4B	XE8B	XFCB	X110B	X124B	X138B	X14CB	DO	In MDI mode
XC0C	XD4C	XE8C	XFCC	X110C	X124C	X138C	X14CC		
XC0D	XD4D	XE8D	XFCD	X110D	X124D	X138D	X14CD		
XC0E	XD4E	XE8E	XFCE	X110E	X124E	X138E	X14CE	SBSMO	Sub part system control: Sub part system control I mode ON
XC0F	XD4F	XE8F	XFCF	X110F	X124F	X138F	X14CF		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC10	XD50	XE90	XFD0	X1110	X1250	X1390	X14D0	MA	Controller ready completion
XC11	XD51	XE91	XFD1	X1111	X1251	X1391	X14D1	SA	Servo ready completion
XC12	XD52	XE92	XFD2	X1112	X1252	X1392	X14D2	OP	In automatic operation "run"
XC13	XD53	XE93	XFD3	X1113	X1253	X1393	X14D3	STL	In automatic operation "start"
XC14	XD54	XE94	XFD4	X1114	X1254	X1394	X14D4	SPL	In automatic operation "pause"
XC15	XD55	XE95	XFD5	X1115	X1255	X1395	X14D5	RST	In "reset"
XC16	XD56	XE96	XFD6	X1116	X1256	X1396	X14D6	CXN	In manual arbitrary feed
XC17	XD57	XE97	XFD7	X1117	X1257	X1397	X14D7	RWD	In rewind

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC18	XD58	XE98	XFD8	X1118	X1258	X1398	X14D8	DEN	Motion command completion
XC19	XD59	XE99	XFD9	X1119	X1259	X1399	X14D9	TIMP	All axes in-position
XC1A	XD5A	XE9A	XFDA	X111A	X125A	X139A	X14DA	TSMZ	All axes smoothing zero
XC1B	XD5B	XE9B	XFDB	X111B	X125B	X139B	X14DB		
XC1C	XD5C	XE9C	XFDC	X111C	X125C	X139C	X14DC	CXFIN	Manual arbitrary feed completion
XC1D	XD5D	XE9D	XFDD	X111D	X125D	X139D	X14DD		External search finished
XC1E	XD5E	XE9E	XFDE	X111E	X125E	X139E	X14DE		
XC1F	XD5F	XE9F	XFDF	X111F	X125F	X139F	X14DF		In high-speed machining mode (G05)

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC20	XD60	XEA0	XFE0	X1120	X1260	X13A0	X14E0	RPN	In rapid traverse
XC21	XD61	XEA1	XFE1	X1121	X1261	X13A1	X14E1	CUT	In cutting feed
XC22	XD62	XEA2	XFE2	X1122	X1262	X13A2	X14E2	TAP	In tapping
XC23	XD63	XEA3	XFE3	X1123	X1263	X13A3	X14E3	THRD	In thread cutting
XC24	XD64	XEA4	XFE4	X1124	X1264	X13A4	X14E4	SYN	In synchronous feed
XC25	XD65	XEA5	XFE5	X1125	X1265	X13A5	X14E5	CSS	In constant surface speed
XC26	XD66	XEA6	XFE6	X1126	X1266	X13A6	X14E6	SKIP	In skip
XC27	XD67	XEA7	XFE7	X1127	X1267	X13A7	X14E7	ZRNN	In reference position return

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC28	XD68	XEA8	XFE8	X1128	X1268	X13A8	X14E8	INCH	In inch unit selection
XC29	XD69	XEA9	XFE9	X1129	X1269	X13A9	X14E9	DLKN	In display lock
XC2A	XD6A	XEAA	XFEA	X112A	X126A	X13AA	X14EA	F1DN	F 1-digit commanded
XC2B	XD6B	XEAB	XFEB	X112B	X126B	X13AB	X14EB	TLFO	In tool life management
XC2C	XD6C	XEAC	XFEC	X112C	X126C	X13AC	X14EC		Tool life management: Temporary cancel of tool life expiration ON
XC2D	XD6D	XEAD	XFED	X112D	X126D	X13AD	X14ED		Tool life management: Temporary cancel of tool group life expiration ON
XC2E	XD6E	XEAE	XFEE	X112E	X126E	X13AE	X14EE	TLOV	Tool life over
XC2F	XD6F	XEAF	XFEF	X112F	X126F	X13AF	X14EF		Tool group life over

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC30	XD70	XEB0	XFF0	X1130	X1270	X13B0	X14F0	F11	F1-digit No. code 1
XC31	XD71	XEB1	XFF1	X1131	X1271	X13B1	X14F1	F12	F1-digit No. code 2
XC32	XD72	XEB2	XFF2	X1132	X1272	X13B2	X14F2	F14	F1-digit No. code 4
XC33	XD73	XEB3	XFF3	X1133	X1273	X13B3	X14F3	F18	F1-digit No. code 8
XC34	XD74	XEB4	XFF4	X1134	X1274	X13B4	X14F4		Timing synchronization between part systems
XC35	XD75	XEB5	XFF5	X1135	X1275	X13B5	X14F5	PCINO	In PLC interrupt
XC36	XD76	XEB6	XFF6	X1136	X1276	X13B6	X14F6		
XC37	XD77	XEB7	XFF7	X1137	X1277	X13B7	X14F7	ASLE	Illegal axis selected

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC38	XD78	XEB8	XFF8	X1138	X1278	X13B8	X14F8		
XC39	XD79	XEB9	XFF9	X1139	X1279	X13B9	X14F9		
XC3A	XD7A	XEBA	XFFA	X113A	X127A	X13BA	X14FA		
XC3B	XD7B	XEBB	XFFB	X113B	X127B	X13BB	X14FB		
XC3C	XD7C	XEBC	XFFC	X113C	X127C	X13BC	X14FC		
XC3D	XD7D	XEBD	XFFD	X113D	X127D	X13BD	X14FD		
XC3E	XD7E	XEBE	XFFE	X113E	X127E	X13BE	X14FE		
XC3F	XD7F	XEBF	XFFF	X113F	X127F	X13BF	X14FF		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC40	XD80	XEC0	X1000	X1140	X1280	X13C0	X1500	DM00	M code independent output M00
XC41	XD81	XEC1	X1001	X1141	X1281	X13C1	X1501	DM01	M code independent output M01
XC42	XD82	XEC2	X1002	X1142	X1282	X13C2	X1502	DM02	M code independent output M02
XC43	XD83	XEC3	X1003	X1143	X1283	X13C3	X1503	DM30	M code independent output M30
XC44	XD84	XEC4	X1004	X1144	X1284	X13C4	X1504		
XC45	XD85	XEC5	X1005	X1145	X1285	X13C5	X1505		
XC46	XD86	XEC6	X1006	X1146	X1286	X13C6	X1506		
XC47	XD87	XEC7	X1007	X1147	X1287	X13C7	X1507		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XC48	XD88	XEC8	X1008	X1148	X1288	X13C8	X1508		In manual speed command valid
XC49	XD89	XEC9	X1009	X1149	X1289	X13C9	X1509	MMS	Manual numerical command
XC4A	XD8A	XECA	X100A	X114A	X128A	X13CA	X150A		In tool escape and return mode
XC4B	XD8B	XECB	X100B	X114B	X128B	X13CB	X150B		
XC4C	XD8C	XECC	X100C	X114C	X128C	X13CC	X150C		
XC4D	XD8D	XECD	X100D	X114D	X128D	X13CD	X150D		
XC4E	XD8E	XECE	X100E	X114E	X128E	X13CE	X150E	SBS	Sub part system control: Sub part system processing
XC4F	XD8F	XECF	X100F	X114F	X128F	X13CF	X150F		In circular feed in manual mode

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XC50	XD90	XED0	X1010	X1150	X1290	X13D0	X1510		
XC51	XD91	XED1	X1011	X1151	X1291	X13D1	X1511		
XC52	XD92	XED2	X1012	X1152	X1292	X13D2	X1512		
XC53	XD93	XED3	X1013	X1153	X1293	X13D3	X1513	TRTN2	In tool retract and return 2 mode ▲
XC54	XD94	XED4	X1014	X1154	X1294	X13D4	X1514		
XC55	XD95	XED5	X1015	X1155	X1295	X13D5	X1515		
XC56	XD96	XED6	X1016	X1156	X1296	X13D6	X1516		
XC57	XD97	XED7	X1017	X1157	X1297	X13D7	X1517		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XC58	XD98	XED8	X1018	X1158	X1298	X13D8	X1518		
XC59	XD99	XED9	X1019	X1159	X1299	X13D9	X1519		
XC5A	XD9A	XEDA	X101A	X115A	X129A	X13DA	X151A		
XC5B	XD9B	XEDB	X101B	X115B	X129B	X13DB	X151B		
XC5C	XD9C	XEDC	X101C	X115C	X129C	X13DC	X151C		
XC5D	XD9D	XEDD	X101D	X115D	X129D	X13DD	X151D		
XC5E	XD9E	XEDE	X101E	X115E	X129E	X13DE	X151E		
XC5F	XD9F	XEDF	X101F	X115F	X129F	X13DF	X151F		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XC60	XDA0	XEE0	X1020	X1160	X12A0	X13E0	X1520	MF1	M function strobe 1
XC61	XDA1	XEE1	X1021	X1161	X12A1	X13E1	X1521	MF2	M function strobe 2
XC62	XDA2	XEE2	X1022	X1162	X12A2	X13E2	X1522	MF3	M function strobe 3
XC63	XDA3	XEE3	X1023	X1163	X12A3	X13E3	X1523	MF4	M function strobe 4
XC64	XDA4	XEE4	X1024	X1164	X12A4	X13E4	X1524	SF1	S function strobe 1
XC65	XDA5	XEE5	X1025	X1165	X12A5	X13E5	X1525	SF2	S function strobe 2
XC66	XDA6	XEE6	X1026	X1166	X12A6	X13E6	X1526	SF3	S function strobe 3
XC67	XDA7	XEE7	X1027	X1167	X12A7	X13E7	X1527	SF4	S function strobe 4

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC68	XDA8	XEE8	X1028	X1168	X12A8	X13E8	X1528	TF1	T function strobe 1
XC69	XDA9	XEE9	X1029	X1169	X12A9	X13E9	X1529	TF2	T function strobe 2
XC6A	XDAA	XEEA	X102A	X116A	X12AA	X13EA	X152A	TF3	T function strobe 3
XC6B	XDAB	XEEB	X102B	X116B	X12AB	X13EB	X152B	TF4	T function strobe 4
XC6C	XDAC	XEEC	X102C	X116C	X12AC	X13EC	X152C	BF1	2nd M function strobe 1
XC6D	XDAD	XEED	X102D	X116D	X12AD	X13ED	X152D	BF2	2nd M function strobe 2
XC6E	XDAE	XEEE	X102E	X116E	X12AE	X13EE	X152E	BF3	2nd M function strobe 3
XC6F	XDAF	XEEF	X102F	X116F	X12AF	X13EF	X152F	BF4	2nd M function strobe 4

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC70	XDB0	XEF0	X1030	X1170	X12B0	X13F0	X1530	SF5	S function strobe 5
XC71	XDB1	XEF1	X1031	X1171	X12B1	X13F1	X1531	SF6	S function strobe 6
XC72	XDB2	XEF2	X1032	X1172	X12B2	X13F2	X1532	SF7	S function strobe 7
XC73	XDB3	XEF3	X1033	X1173	X12B3	X13F3	X1533	SF8	S function strobe 8
XC74	XDB4	XEF4	X1034	X1174	X12B4	X13F4	X1534		
XC75	XDB5	XEF5	X1035	X1175	X12B5	X13F5	X1535		
XC76	XDB6	XEF6	X1036	X1176	X12B6	X13F6	X1536		
XC77	XDB7	XEF7	X1037	X1177	X12B7	X13F7	X1537		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC78	XDB8	XEF8	X1038	X1178	X12B8	X13F8	X1538		
XC79	XDB9	XEF9	X1039	X1179	X12B9	X13F9	X1539		
XC7A	XDBA	XEFA	X103A	X117A	X12BA	X13FA	X153A		
XC7B	XDBB	XEFB	X103B	X117B	X12BB	X13FB	X153B		
XC7C	XDBC	XEFC	X103C	X117C	X12BC	X13FC	X153C		
XC7D	XDBD	XEFD	X103D	X117D	X12BD	X13FD	X153D		
XC7E	XDBE	XEFE	X103E	X117E	X12BE	X13FE	X153E		
XC7F	XDBF	XEFF	X103F	X117F	X12BF	X13FF	X153F	CHPRCC	Chopping compensation update prevented

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XC80	XDC0	XF00	X1040	X1180	X12C0	X1400	X1540	CHOP	In chopping start
XC81	XDC1	XF01	X1041	X1181	X12C1	X1401	X1541	CHP1	Basic position -> upper dead point path flag
XC82	XDC2	XF02	X1042	X1182	X12C2	X1402	X1542	CHP2	Upper dead point -> bottom dead point path flag
XC83	XDC3	XF03	X1043	X1183	X12C3	X1403	X1543	CHP3	Bottom dead point -> upper dead point path flag
XC84	XDC4	XF04	X1044	X1184	X12C4	X1404	X1544	CHP4	Upper dead point -> basic position path flag
XC85	XDC5	XF05	X1045	X1185	X12C5	X1405	X1545	CHPMD	In chopping mode
XC86	XDC6	XF06	X1046	X1186	X12C6	X1406	X1546		Stroke compensation completion
XC87	XDC7	XF07	X1047	X1187	X12C7	X1407	X1547		Tool escape and return transit point recognition completed

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XC88	XDC8	XF08	X1048	X1188	X12C8	X1408	X1548		
XC89	XDC9	XF09	X1049	X1189	X12C9	X1409	X1549		
XC8A	XDCA	XF0A	X104A	X118A	X12CA	X140A	X154A	SSE	Search & start Error
XC8B	XDCB	XF0B	X104B	X118B	X12CB	X140B	X154B	SSG	Search & start Search
XC8C	XDCC	XF0C	X104C	X118C	X12CC	X140C	X154C		
XC8D	XDCD	XF0D	X104D	X118D	X12CD	X140D	X154D		
XC8E	XDCE	XF0E	X104E	X118E	X12CE	X140E	X154E		
XC8F	XDCF	XF0F	X104F	X118F	X12CF	X140F	X154F		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XC90	XDD0	XF10	X1050	X1190	X12D0	X1410	X1550		
XC91	XDD1	XF11	X1051	X1191	X12D1	X1411	X1551		
XC92	XDD2	XF12	X1052	X1192	X12D2	X1412	X1552		
XC93	XDD3	XF13	X1053	X1193	X12D3	X1413	X1553	TCP	Tool change position return completion
XC94	XDD4	XF14	X1054	X1194	X12D4	X1414	X1554	TCRQ	New tool change
XC95	XDD5	XF15	X1055	X1195	X12D5	X1415	X1555		All spindles simultaneous control (G47.1)
XC96	XDD6	XF16	X1056	X1196	X12D6	X1416	X1556		Life prediction
XC97	XDD7	XF17	X1057	X1197	X12D7	X1417	X1557		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XC98	XDD8	XF18	X1058	X1198	X12D8	X1418	X1558	AL1	NC alarm 1
XC99	XDD9	XF19	X1059	X1199	X12D9	X1419	X1559	AL2	NC alarm 2 (Servo alarm)
XC9A	XDDA	XF1A	X105A	X119A	X12DA	X141A	X155A	AL3	NC alarm 3 (Program error)
XC9B	XDDB	XF1B	X105B	X119B	X12DB	X141B	X155B	AL4	NC alarm 4 (Operation error)
XC9C	XDDC	XF1C	X105C	X119C	X12DC	X141C	X155C	WR1	NC warning (Servo warning)
XC9D	XDDD	XF1D	X105D	X119D	X12DD	X141D	X155D		
XC9E	XDDE	XF1E	X105E	X119E	X12DE	X141E	X155E		
XC9F	XDDF	XF1F	X105F	X119F	X12DF	X141F	X155F		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XCA0	XDE0	XF20	X1060	X11A0	X12E0	X1420	X1560		Load monitor I :Teaching/Monitor mode in execution ▲
XCA1	XDE1	XF21	X1061	X11A1	X12E1	X1421	X1561		Load monitor I : Teaching mode valid ▲
XCA2	XDE2	XF22	X1062	X11A2	X12E2	X1422	X1562		Load monitor I : Monitor mode valid ▲
XCA3	XDE3	XF23	X1063	X11A3	X12E3	X1423	X1563		Load monitor I : Adaptive control in execution ▲
XCA4	XDE4	XF24	X1064	X11A4	X12E4	X1424	X1564		
XCA5	XDE5	XF25	X1065	X11A5	X12E5	X1425	X1565	TRVE	Tap retract possible
XCA6	XDE6	XF26	X1066	X11A6	X12E6	X1426	X1566	PCNT	No. of work machining over
XCA7	XDE7	XF27	X1067	X11A7	X12E7	X1427	X1567	ABSW	Absolute position warning

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XCA8	XDE8	XF28	X1068	X11A8	X12E8	X1428	X1568		
XCA9	XDE9	XF29	X1069	X11A9	X12E9	X1429	X1569		In axis name switch
XCAA	XDEA	XF2A	X106A	X11AA	X12EA	X142A	X156A		Optimum acceleration/deceleration parameter switch completion [axis] ▲
XCAB	XDEB	XF2B	X106B	X11AB	X12EB	X142B	X156B	ESTSVIN	Optimum acceleration/deceleration selection : NC axis inertia estimation in progress ▲
XCAC	XDEC	XF2C	X106C	X11AC	X12EC	X142C	X156C	GETSVAF	Optimum acceleration/deceleration selection : NC axis estimated resonance frequency acquisition in progress ▲
XCAD	XDED	XF2D	X106D	X11AD	X12ED	X142D	X156D		
XCAE	XDEE	XF2E	X106E	X11AE	X12EE	X142E	X156E	HOBRTM	Hob machining: retracting
XCAF	XDEF	XF2F	X106F	X11AF	X12EF	X142F	X156F	HOBRTF	Hob machining: retract complete

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XCB0	XDF0	XF30	X1070	X11B0	X12F0	X1430	X1570		In spindle-NC axis polygon mode
XCB1	XDF1	XF31	X1071	X11B1	X12F1	X1431	X1571	AL5	NC alarm 5
XCB2	XDF2	XF32	X1072	X11B2	X12F2	X1432	X1572		In spindle-spindle polygon mode
XCB3	XDF3	XF33	X1073	X11B3	X12F3	X1433	X1573		Spindle-spindle polygon synchronization completion
XCB4	XDF4	XF34	X1074	X11B4	X12F4	X1434	X1574		
XCB5	XDF5	XF35	X1075	X11B5	X12F5	X1435	X1575		
XCB6	XDF6	XF36	X1076	X11B6	X12F6	X1436	X1576		
XCB7	XDF7	XF37	X1077	X11B7	X12F7	X1437	X1577		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XCB8	XDF8	XF38	X1078	X11B8	X12F8	X1438	X1578		
XCB9	XDF9	XF39	X1079	X11B9	X12F9	X1439	X1579		In 3-dimensional coordinate conversion
XCBA	XDFA	XF3A	X107A	X11BA	X12FA	X143A	X157A		
XCBB	XDFB	XF3B	X107B	X11BB	X12FB	X143B	X157B		
XCBC	XDFC	XF3C	X107C	X11BC	X12FC	X143C	X157C		
XCBD	XDFD	XF3D	X107D	X11BD	X12FD	X143D	X157D		
XCBE	XDFE	XF3E	X107E	X11BE	X12FE	X143E	X157E		
XCBF	XDFF	XF3F	X107F	X11BF	X12FF	X143F	X157F		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
XCC0	XE00	XF40	X1080	X11C0	X1300	X1440	X1580	RTAP	In synchronized tapping selection (M command)
XCC1	XE01	XF41	X1081	X11C1	X1301	X1441	X1581		In small diameter deep hole cycle
XCC2	XE02	XF42	X1082	X11C2	X1300	X1442	X1582		High-speed retract function valid state ▲
XCC3	XE03	XF43	X1083	X11C3	X1303	X1443	X1583		In high-speed retract function operation ▲
XCC4	XE04	XF44	X1084	X11C4	X1304	X1444	X1584		
XCC5	XE05	XF45	X1085	X11C5	X1305	X1445	X1585		
XCC6	XE06	XF46	X1086	X11C6	X1306	X1446	X1586		
XCC7	XE07	XF47	X1087	X11C7	X1307	X1447	X1587		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XCC8	XE08	XF48	X1088	X11C8	X1308	X1448	X1588		In barrier valid (left)
XCC9	XE09	XF49	X1089	X11C9	X1309	X1449	X1589		In barrier valid (right)
XCCA	XE0A	XF4A	X108A	X11CA	X130A	X144A	X158A	TLMSFIN	Tool length measurement completion ▲
XCCB	XE0B	XF4B	X108B	X11CB	X130B	X144B	X158B	TLMSERR	Tool length measurement error ▲
XCCC	XE0C	XF4C	X108C	X11CC	X130C	X144C	X158C		
XCCD	XE0D	XF4D	X108D	X11CD	X130D	X144D	X158D		
XCCE	XE0E	XF4E	X108E	X11CE	X130E	X144E	X158E	TLMSSELO	Tool length measurement sub-side selected ▲
XCCF	XE0F	XF4F	X108F	X11CF	X130F	X144F	X158F		Tool retract position reached ▲

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XCD0	XE10	XF50	X1090	X11D0	X1310	X1450	X1590	TRME	With tool retract amount command ▲
XCD1	XE11	XF51	X1091	X11D1	X1311	X1451	X1591	TRRP	In tool repositioning ▲
XCD2	XE12	XF52	X1092	X11D2	X1312	X1452	X1592		
XCD3	XE13	XF53	X1093	X11D3	X1313	X1453	X1593		
XCD4	XE14	XF54	X1094	X11D4	X1314	X1454	X1594		
XCD5	XE15	XF55	X1095	X11D5	X1315	X1455	X1595		
XCD6	XE16	XF56	X1096	X11D6	X1316	X1456	X1596		
XCD7	XE17	XF57	X1097	X11D7	X1317	X1457	X1597		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XCD8	XE18	XF58	X1098	X11D8	X1318	X1458	X1598		Door open enable
XCD9	XE19	XF59	X1099	X11D9	X1319	X1459	X1599		
XCDA	XE1A	XF5A	X109A	X11DA	X131A	X145A	X159A		
XCDB	XE1B	XF5B	X109B	X11DB	X131B	X145B	X159B		
XCDC	XE1C	XF5C	X109C	X11DC	X131C	X145C	X159C		
XCDD	XE1D	XF5D	X109D	X11DD	X131D	X145D	X159D		
XCDE	XE1E	XF5E	X109E	X11DE	X131E	X145E	X159E		
XCDF	XE1F	XF5F	X109F	X11DF	X131F	X145F	X159F		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XCE0	XE20	XF60	X10A0	X11E0	X1320	X1460	X15A0		
XCE1	XE21	XF61	X10A1	X11E1	X1321	X1461	X15A1		
XCE2	XE22	XF62	X10A2	X11E2	X1322	X1462	X15A2		
XCE3	XE23	XF63	X10A3	X11E3	X1323	X1463	X15A3		
XCE4	XE24	XF64	X10A4	X11E4	X1324	X1464	X15A4		
XCE5	XE25	XF65	X10A5	X11E5	X1325	X1465	X15A5		
XCE6	XE26	XF66	X10A6	X11E6	X1326	X1466	X15A6		
XCE7	XE27	XF67	X10A7	X11E7	X1327	X1467	X15A7		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XCE8	XE28	XF68	X10A8	X11E8	X1328	X1468	X15A8		Door open enable (2 channels per 1 part system)
XCE9	XE29	XF69	X10A9	X11E9	X1329	X1469	X15A9		
XCEA	XE2A	XF6A	X10AA	X11EA	X132A	X146A	X15AA		
XCEB	XE2B	XF6B	X10AB	X11EB	X132B	X146B	X15AB		
XCEC	XE2C	XF6C	X10AC	X11EC	X132C	X146C	X15AC		
XCED	XE2D	XF6D	X10AD	X11ED	X132D	X146D	X15AD		Optimum machining diagnosis in progress ▲
XCEE	XE2E	XF6E	X10AE	X11EE	X132E	X146E	X15AE		Load monitor I : Cutting torque estimation in progress
XCEF	XE2F	XF6F	X10AF	X11EF	X132F	X146F	X15AF		Load monitor I : Cutting torque estimation completed

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XCF0	XE30	XF70	X10B0	X11F0	X1330	X1470	X15B0		
XCF1	XE31	XF71	X10B1	X11F1	X1331	X1471	X15B1		
XCF2	XE32	XF72	X10B2	X11F2	X1332	X1472	X15B2		
XCF3	XE33	XF73	X10B3	X11F3	X1333	X1473	X15B3		
XCF4	XE34	XF74	X10B4	X11F4	X1334	X1474	X15B4		
XCF5	XE35	XF75	X10B5	X11F5	X1335	X1475	X15B5		
XCF6	XE36	XF76	X10B6	X11F6	X1336	X1476	X15B6		
XCF7	XE37	XF77	X10B7	X11F7	X1337	X1477	X15B7		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XCF8	XE38	XF78	X10B8	X11F8	X1338	X1478	X15B8		
XCF9	XE39	XF79	X10B9	X11F9	X1339	X1479	X15B9	GLMT	Torque limitation skip: G160 torque limit ON
XCFA	XE3A	XF7A	X10BA	X11FA	X133A	X147A	X15BA		
XCFB	XE3B	XF7B	X10BB	X11FB	X133B	X147B	X15BB		
XCFC	XE3C	XF7C	X10BC	X11FC	X133C	X147C	X15BC		
XCFD	XE3D	XF7D	X10BD	X11FD	X133D	X147D	X15BD		
XCFE	XE3E	XF7E	X10BE	X11FE	X133E	X147E	X15BE		
XCFF	XE3F	XF7F	X10BF	X11FF	X133F	X147F	X15BF		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XD00	XE40	XF80	X10C0	X1200	X1340	X1480	X15C0		
XD01	XE41	XF81	X10C1	X1201	X1341	X1481	X15C1		
XD02	XE42	XF82	X10C2	X1202	X1342	X1482	X15C2		
XD03	XE43	XF83	X10C3	X1203	X1343	X1483	X15C3		
XD04	XE44	XF84	X10C4	X1204	X1344	X1484	X15C4		
XD05	XE45	XF85	X10C5	X1205	X1345	X1485	X15C5		
XD06	XE46	XF86	X10C6	X1206	X1346	X1486	X15C6		
XD07	XE47	XF87	X10C7	X1207	X1347	X1487	X15C7		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XD08	XE48	XF88	X10C8	X1208	X1348	X1488	X15C8		
XD09	XE49	XF89	X10C9	X1209	X1349	X1489	X15C9		
XD0A	XE4A	XF8A	X10CA	X120A	X134A	X148A	X15CA		
XD0B	XE4B	XF8B	X10CB	X120B	X134B	X148B	X15CB	G0AC	Rapid traverse time constant: In switchover
XD0C	XE4C	XF8C	X10CC	X120C	X134C	X148C	X15CC		
XD0D	XE4D	XF8D	X10CD	X120D	X134D	X148D	X15CD		
XD0E	XE4E	XF8E	X10CE	X120E	X134E	X148E	X15CE		
XD0F	XE4F	XF8F	X10CF	X120F	X134F	X148F	X15CF		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XD10	XE50	XF90	X10D0	X1210	X1350	X1490	X15D0		
XD11	XE51	XF91	X10D1	X1211	X1351	X1491	X15D1		
XD12	XE52	XF92	X10D2	X1212	X1352	X1492	X15D2		
XD13	XE53	XF93	X10D3	X1213	X1353	X1493	X15D3		
XD14	XE54	XF94	X10D4	X1214	X1354	X1494	X15D4		3D coordinate conversion : Manual feed valid ▲
XD15	XE55	XF95	X10D5	X1215	X1355	X1495	X15D5		
XD16	XE56	XF96	X10D6	X1216	X1356	X1496	X15D6		
XD17	XE57	XF97	X10D7	X1217	X1357	X1497	X15D7		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XD18	XE58	XF98	X10D8	X1218	X1358	X1498	X15D8	MJST	Tool axis coordinate system in 3D manual feed (JOG, INC)
XD19	XE59	XF99	X10D9	X1219	X1359	X1499	X15D9	MJSB	Table coordinate system in 3D manual feed (JOG, INC)
XD1A	XE5A	XF9A	X10DA	X121A	X135A	X149A	X15DA	MJSF	Feature coordinate system in 3D manual feed (JOG, INC)
XD1B	XE5B	XF9B	X10DB	X121B	X135B	X149B	X15DB	MH1ST	Tool axis coordinate system in 3D manual feed (1st handle)
XD1C	XE5C	XF9C	X10DC	X121C	X135C	X149C	X15DC	MH1SB	Table coordinate system in 3D manual feed (1st handle)
XD1D	XE5D	XF9D	X10DD	X121D	X135D	X149D	X15DD	MH1SF	Feature coordinate system in 3D manual feed (1st handle)
XD1E	XE5E	XF9E	X10DE	X121E	X135E	X149E	X15DE	MH2ST	Tool axis coordinate system in 3D manual feed (2nd handle)
XD1F	XE5F	XF9F	X10DF	X121F	X135F	X149F	X15DF	MH2SB	Table coordinate system in 3D manual feed (2nd handle)

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XD20	XE60	XFA0	X10E0	X1220	X1360	X14A0	X15E0	MH2SF	Feature coordinate system in 3D manual feed (2nd handle)
XD21	XE61	XFA1	X10E1	X1221	X1361	X14A1	X15E1	MH3ST	Tool axis coordinate system in 3D manual feed (3rd handle)
XD22	XE62	XFA2	X10E2	X1222	X1362	X14A2	X15E2	MH3SB	Table coordinate system in 3D manual feed (3rd handle)
XD23	XE63	XFA3	X10E3	X1223	X1363	X14A3	X15E3	MH3SF	Feature coordinate system in 3D manual feed (3rd handle)
XD24	XE64	XFA4	X10E4	X1224	X1364	X14A4	X15E4		
XD25	XE65	XFA5	X10E5	X1225	X1365	X14A5	X15E5		
XD26	XE66	XFA6	X10E6	X1226	X1366	X14A6	X15E6		
XD27	XE67	XFA7	X10E7	X1227	X1367	X14A7	X15E7	TCPRS	In tool center point rotation

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XD28	XE68	XFA8	X10E8	X1228	X1368	X14A8	X15E8	RSSCT	R-Navi: selecting machine surface
XD29	XE69	XFA9	X10E9	X1229	X1369	X14A9	X15E9	RSIND	R-Navi: machine surface indexing
XD2A	XE6A	XFAA	X10EA	X122A	X136A	X14AA	X15EA	RSIDF	R-Navi: machine surface index complete
XD2B	XE6B	XFAB	X10EB	X122B	X136B	X14AB	X15EB		
XD2C	XE6C	XFAC	X10EC	X122C	X136C	X14AC	X15EC		
XD2D	XE6D	XFAD	X10ED	X122D	X136D	X14AD	X15ED		
XD2E	XE6E	XFAE	X10EE	X122E	X136E	X14AE	X15EE		
XD2F	XE6F	XFAF	X10EF	X122F	X136F	X14AF	X15EF		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X1870			X1878		Edit/search window displayed
X1871			X1879		
X1872			X187A		
X1873			X187B		
X1874			X187C		
X1875			X187D		
X1876			X187E		
X1877			X187F		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X1880	X18E0	X1940	X19A0	X1A00	X1A60	X1AC0	X1B20	SUPP	Spindle rotation upper limit exceeded
X1881	X18E1	X1941	X19A1	X1A01	X1A61	X1AC1	X1B21	SLOW	Spindle rotation lower limit exceeded
X1882	X18E2	X1942	X19A2	X1A02	X1A62	X1AC2	X1B22	SIGE	S command gear No. illegal
X1883	X18E3	X1943	X19A3	X1A03	X1A63	X1AC3	X1B23	SOVE	S command max./min. command value over
X1884	X18E4	X1944	X19A4	X1A04	X1A64	X1AC4	X1B24	SNGE	S command no gear selected
X1885	X18E5	X1945	X19A5	X1A05	X1A65	X1AC5	X1B25	GR1	Spindle gear shift command 1
X1886	X18E6	X1946	X19A6	X1A06	X1A66	X1AC6	X1B26	GR2	Spindle gear shift command 2
X1887	X18E7	X1947	X19A7	X1A07	X1A67	X1AC7	X1B27	-	(Always "0")

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X1888	X18E8	X1948	X19A8	X1A08	X1A68	X1AC8	X1B28		Spindle 2nd in-position
X1889	X18E9	X1949	X19A9	X1A09	X1A69	X1AC9	X1B29	CDO	Current detection
X188A	X18EA	X194A	X19AA	X1A0A	X1A6A	X1ACA	X1B2A	VRO	Speed detection
X188B	X18EB	X194B	X19AB	X1A0B	X1A6B	X1ACB	X1B2B	FLO	In spindle alarm
X188C	X18EC	X194C	X19AC	X1A0C	X1A6C	X1ACC	X1B2C	ZSO	Zero speed
X188D	X18ED	X194D	X19AD	X1A0D	X1A6D	X1ACD	X1B2D	USO	Spindle up-to-speed
X188E	X18EE	X194E	X19AE	X1A0E	X1A6E	X1ACE	X1B2E	ORAO	Spindle in-position
X188F	X18EF	X194F	X19AF	X1A0F	X1A6F	X1ACF	X1B2F	LCSA	In L coil selection

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X1890	X18F0	X1950	X19B0	X1A10	X1A70	X1AD0	X1B30	SMA	Spindle ready-ON
X1891	X18F1	X1951	X19B1	X1A11	X1A71	X1AD1	X1B31	SSA	Spindle servo-ON
X1892	X18F2	X1952	X19B2	X1A12	X1A72	X1AD2	X1B32	SEMG	In spindle emergency stop
X1893	X18F3	X1953	X19B3	X1A13	X1A73	X1AD3	X1B33	SSRN	In spindle forward run
X1894	X18F4	X1954	X19B4	X1A14	X1A74	X1AD4	X1B34	SSRI	In spindle reverse run
X1895	X18F5	X1955	X19B5	X1A15	X1A75	X1AD5	X1B35		Z phase passed
X1896	X18F6	X1956	X19B6	X1A16	X1A76	X1AD6	X1B36	SIMP	Position loop in-position
X1897	X18F7	X1957	X19B7	X1A17	X1A77	X1AD7	X1B37	STLQ	In spindle torque limit

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X1898	X18F8	X1958	X19B8	X1A18	X1A78	X1AD8	X1B38		
X1899	X18F9	X1959	X19B9	X1A19	X1A79	X1AD9	X1B39		
X189A	X18FA	X195A	X19BA	X1A1A	X1A7A	X1ADA	X1B3A		Spindle torque limit reached
X189B	X18FB	X195B	X19BB	X1A1B	X1A7B	X1ADB	X1B3B		
X189C	X18FC	X195C	X19BC	X1A1C	X1A7C	X1ADC	X1B3C		
X189D	X18FD	X195D	X19BD	X1A1D	X1A7D	X1ADD	X1B3D	SD2	Speed detection 2
X189E	X18FE	X195E	X19BE	X1A1E	X1A7E	X1ADE	X1B3E	MCSA	In M coil selection
X189F	X18FF	X195F	X19BF	X1A1F	X1A7F	X1ADF	X1B3F		Index positioning completion

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X18A0	X1900	X1960	X19C0	X1A20	X1A80	X1AE0	X1B40	ENB	Spindle enable
X18A1	X1901	X1961	X19C1	X1A21	X1A81	X1AE1	X1B41	LRUC	In changeover to L coil ▲
X18A2	X1902	X1962	X19C2	X1A22	X1A82	X1AE2	X1B42	HRUC	In changeover to H coil ▲
X18A3	X1903	X1963	X19C3	X1A23	X1A83	X1AE3	X1B43		
X18A4	X1904	X1964	X19C4	X1A24	X1A84	X1AE4	X1B44		
X18A5	X1905	X1965	X19C5	X1A25	X1A85	X1AE5	X1B45		
X18A6	X1906	X1966	X19C6	X1A26	X1A86	X1AE6	X1B46		
X18A7	X1907	X1967	X19C7	X1A27	X1A87	X1AE7	X1B47		Spindle synchronization speed detect ▲

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X18A8	X1908	X1968	X19C8	X1A28	X1A88	X1AE8	X1B48	SPSYN 1	In spindle synchronization
X18A9	X1909	X1969	X19C9	X1A29	X1A89	X1AE9	X1B49	FSPRV	Spindle rotation speed synchronization completion
X18AA	X190A	X196A	X19CA	X1A2A	X1A8A	X1AEA	X1B4A	FSPPH	Spindle phase synchronization completion
X18AB	X190B	X196B	X19CB	X1A2B	X1A8B	X1AEB	X1B4B	SPSYN 2	In spindle synchronization 2
X18AC	X190C	X196C	X19CC	X1A2C	X1A8C	X1AE8C	X1B4C	SPCMP	Chuck close confirmation
X18AD	X190D	X196D	X19CD	X1A2D	X1A8D	X1AED	X1B4D	TSS1	Tool spindle synchronization I (Polygon) ON
X18AE	X190E	X196E	X19CE	X1A2E	X1A8E	X1AEE	X1B4E	SPSYN 3	In tool spindle synchronization II
X18AF	X190F	X196F	X19CF	X1A2F	X1A8F	X1AEF	X1B4F	SPNCH	Spindle superimposition control: Speed change disabled

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X18B0	X1910	X1970	X19D0	X1A30	X1A90	X1AF0	X1B50		
X18B1	X1911	X1971	X19D1	X1A31	X1A91	X1AF1	X1B51	SPILE	Spindle superimposition control ON
X18B2	X1912	X1972	X19D2	X1A32	X1A92	X1AF2	X1B52	SPLCR	Spindle superimposition control: Spindle superimposition clamped
X18B3	X1913	X1973	X19D3	X1A33	X1A93	X1AF3	X1B53	PHOVR	Hob axis delay excess
X18B4	X1914	X1974	X19D4	X1A34	X1A94	X1AF4	X1B54		
X18B5	X1915	X1975	X19D5	X1A35	X1A95	X1AF5	X1B55	EXOFN	In spindle holding force up
X18B6	X1916	X1976	X19D6	X1A36	X1A96	X1AF6	X1B56	SPOFF A	Spindle being excluded
X18B7	X1917	X1977	X19D7	X1A37	X1A97	X1AF7	X1B57		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X18B8	X1918	X1978	X19D8	X1A38	X1A98	X1AF8	X1B58		
X18B9	X1919	X1979	X19D9	X1A39	X1A99	X1AF9	X1B59		
X18BA	X191A	X197A	X19DA	X1A3A	X1A9A	X1AFA	X1B5A		
X18BB	X191B	X197B	X19DB	X1A3B	X1A9B	X1AFB	X1B5B		
X18BC	X191C	X197C	X19DC	X1A3C	X1A9C	X1AFC	X1B5C		
X18BD	X191D	X197D	X19DD	X1A3D	X1A9D	X1AFD	X1B5D		
X18BE	X191E	X197E	X19DE	X1A3E	X1A9E	X1AFE	X1B5E		
X18BF	X191F	X197F	X19DF	X1A3F	X1A9F	X1AFF	X1B5F		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X18C0	X1920	X1980	X19E0	X1A40	X1AA0	X1B00	X1B60		
X18C1	X1921	X1981	X19E1	X1A41	X1AA1	X1B01	X1B61	SVMD	Spindle position control (Spindle/C axis control): C axis mode ON
X18C2	X1922	X1982	X19E2	X1A42	X1AA2	X1B02	X1B62	GO1	Spindle gear selection output 1
X18C3	X1923	X1983	X19E3	X1A43	X1AA3	X1B03	X1B63	GO2	Spindle gear selection output 2
X18C4	X1924	X1984	X19E4	X1A44	X1AA4	X1B04	X1B64		
X18C5	X1925	X1985	X19E5	X1A45	X1AA5	X1B05	X1B65		
X18C6	X1926	X1986	X19E6	X1A46	X1AA6	X1B06	X1B66		
X18C7	X1927	X1987	X19E7	X1A47	X1AA7	X1B07	X1B67		
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev	Signal name
X18C8	X1928	X1988	X19E8	X1A48	X1AA8	X1B08	X1B68		Spindle oscillation in progress
X18C9	X1929	X1989	X19E9	X1A49	X1AA9	X1B09	X1B69		
X18CA	X192A	X198A	X19EA	X1A4A	X1AAA	X1B0A	X1B6A	VGHLD	Real-time tuning 1: Speed gain hold-down ON
X18CB	X192B	X198B	X19EB	X1A4B	X1AAB	X1B0B	X1B6B		
X18CC	X192C	X198C	X19EC	X1A4C	X1AAC	X1B0C	X1B6C		
X18CD	X192D	X198D	X19ED	X1A4D	X1AAD	X1B0D	X1B6D		
X18CE	X192E	X198E	X19EE	X1A4E	X1AAE	X1B0E	X1B6E		
X18CF	X192F	X198F	X19EF	X1A4F	X1AAF	X1B0F	X1B6F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
X1CD0		Handy terminal key 1	X1CD8		Handy terminal key 9
X1CD1		Handy terminal key 2	X1CD9		Handy terminal key 10
X1CD2		Handy terminal key 3	X1CDA		Handy terminal key 11
X1CD3		Handy terminal key 4	X1CDB		Handy terminal key 12
X1CD4		Handy terminal key 5	X1CDC		Handy terminal key 13
X1CD5		Handy terminal key 6	X1CDD		Handy terminal key 14
X1CD6		Handy terminal key 7	X1CDE		Handy terminal key 15
X1CD7		Handy terminal key 8	X1CDF		Handy terminal key 16
Device	**Abbrev.**	**Signal name**	**Device**	**Abbrev.**	**Signal name**
X1CE0		Handy terminal key 17	X1CE8		Handy terminal key 25
X1CE1		Handy terminal key 18	X1CE9		Handy terminal key 26
X1CE2		Handy terminal key 19	X1CEA		Handy terminal key 27
X1CE3		Handy terminal key 20	X1CEB		Handy terminal key 28
X1CE4		Handy terminal key 21	X1CEC		Handy terminal key 29
X1CE5		Handy terminal key 22	X1CED		Handy terminal key 30
X1CE6		Handy terminal key 23	X1CEE		Handy terminal key 31
X1CE7		Handy terminal key 24	X1CEF		Handy terminal key 32
Device	**Abbrev.**	**Signal name**	**Device**	**Abbrev.**	**Signal name**
X1CF0		Handy terminal key 33	X1CF8		Handy terminal key 41
X1CF1		Handy terminal key 34	X1CF9		Handy terminal key 42
X1CF2		Handy terminal key 35	X1CFA		Handy terminal key 43
X1CF3		Handy terminal key 36	X1CFB		Handy terminal key 44
X1CF4		Handy terminal key 37	X1CFC		Handy terminal key 45
X1CF5		Handy terminal key 38	X1CFD		
X1CF6		Handy terminal key 39	X1CFE		
X1CF7		Handy terminal key 40	X1CFF		

Device No.					
$1	**$2**	**$3**	**$4**	**Abbrev.**	**Signal name**
X1D00	X1D20	X1D40	X1D60	PSW1	Position switch 1
X1D01	X1D21	X1D41	X1D61	PSW2	Position switch 2
X1D02	X1D22	X1D42	X1D62	PSW3	Position switch 3
X1D03	X1D23	X1D43	X1D63	PSW4	Position switch 4
X1D04	X1D24	X1D44	X1D64	PSW5	Position switch 5
X1D05	X1D25	X1D45	X1D65	PSW6	Position switch 6
X1D06	X1D26	X1D46	X1D66	PSW7	Position switch 7
X1D07	X1D27	X1D47	X1D67	PSW8	Position switch 8

Device No.					
$1	**$2**	**$3**	**$4**	**Abbrev.**	**Signal name**
X1D08	X1D28	X1D48	X1D68	PSW9	Position switch 9
X1D09	X1D29	X1D49	X1D69	PSW10	Position switch 10
X1D0A	X1D2A	X1D4A	X1D6A	PSW11	Position switch 11
X1D0B	X1D2B	X1D4B	X1D6B	PSW12	Position switch 12
X1D0C	X1D2C	X1D4C	X1D6C	PSW13	Position switch 13
X1D0D	X1D2D	X1D4D	X1D6D	PSW14	Position switch 14
X1D0E	X1D2E	X1D4E	X1D6E	PSW15	Position switch 15
X1D0F	X1D2F	X1D4F	X1D6F	PSW16	Position switch 16

Device No.					
$1	**$2**	**$3**	**$4**	**Abbrev.**	**Signal name**
X1D10	X1D30	X1D50	X1D70	PSW17	Position switch 17
X1D11	X1D31	X1D51	X1D71	PSW18	Position switch 18
X1D12	X1D32	X1D52	X1D72	PSW19	Position switch 19
X1D13	X1D33	X1D53	X1D73	PSW20	Position switch 20
X1D14	X1D34	X1D54	X1D74	PSW21	Position switch 21
X1D15	X1D35	X1D55	X1D75	PSW22	Position switch 22
X1D16	X1D36	X1D56	X1D76	PSW23	Position switch 23
X1D17	X1D37	X1D57	X1D77	PSW24	Position switch 24

2.2 PLC Input Signals (Data type: R***)

(Note) Signal with " ▲ " is prepared for a specific machine tool builder.

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R0	AI1	Analog input 1	R8		KEY IN 1
R1	AI2	Analog input 2	R9		
R2	AI3	Analog input 3	R10		
R3	AI4	Analog input 4	R11		Clock data Year/Month
R4	AI5	Analog input 5	R12		Clock data Date/Hour
R5	AI6	Analog input 6	R13		Clock data Minute/Second
R6	AI7	Analog input 7	R14		
R7	AI8	Analog input 8	R15		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R16		CNC software version code A	R24		
R17		CNC software version code B	R25		PC high-speed process time
R18		CNC software version code C1	R26		Turret interference check status
R19		CNC software version code C2	R27		Interference object alarm information
R20			R28		
R21			R29		
R22			R30		Remote program input error information ▲
R23			R31		Diagnosis data output

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R32			R40		ASYNC error: exceptional occurrence R register number ▲
R33			R41		
R34			R42		
R35			R43		
R36			R44		
R37		PLC window parameter status	R45		
R38		ASYNC error: exceptional occurrence step number ▲	R46		
R39			R47		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R48			R56		Battery drop cause
R49			R57		Temperature warning cause
R50			R58		5V/24V error cause
R51			R59		Control unit temperature 2
R52			R60		Control unit temperature
R53			R61		
R54			R62		Tool ID communication error information ▲
R55			R63		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R64			R72		Ball screw thermal displacement compensation Compensation amount 1st [M] axis
R65			R73		Ball screw thermal displacement compensation Compensation amount 2nd [M] axis
R66			R74		Ball screw thermal displacement compensation Compensation amount 3rd [M] axis
R67			R75		Ball screw thermal displacement compensation Compensation amount 4th [M] axis
R68		PLC main scan time	R76		
R69		Emergency stop cause	R77		
R70		DIO card information	R78		
R71			R79		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R80			R88		
R81			R89		
R82			R90		Modbus/TCP connection request monitor ▲
R83		Modbus/RTU received packet monitor ▲	R91		Modbus/TCP number of connections monitor ▲
R84		Modbus/RTU communication error monitor ▲	R92		Modbus/TCP received packet monitor ▲
R85		Modal task data update cycle	R93		Modbus/TCP communication error monitor ▲
R86			R94		Modbus/TCP protocol error packet monitor ▲
R87			R95		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R96	SMDOEN	Speed monitor door open possible	R104		
R97			R105		
R98	SOPFN	Multi-step speed monitor selected speed output ▲	R106		
R99			R107		
R100			R108		
R101			R109		
R102			R110		
R103			R111		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R112			R120	DTPPC	Power consumption computation: Present consumption of entire drive system(L)
R113			R121		Power consumption computation: Present consumption of entire drive system(H)
R114			R122	DTIPC1	Power consumption computation: Accumulated consumption of entire drive system 1(L)
R115			R123		Power consumption computation: Accumulated consumption of entire drive system 1(H)
R116	HS1PCNT	Handle feed: 1st handle pulse counter	R124	DTIPC2	Power consumption computation: Accumulated consumption of entire drive system 2(L)
R117	HS2PCNT	Handle feed: 2nd handle pulse counter	R125		Power consumption computation: Accumulated consumption of entire drive system 2(H)
R118	HS3PCNT	Handle feed: 3rd handle pulse counter	R126	DTIPC3	Power consumption computation: Accumulated consumption of entire drive system 3(L)
R119			R127		Power consumption computation: Accumulated consumption of entire drive system 3(H)
R128	DTIPC4	Power consumption computation: Accumulated consumption of entire drive system 4(L)	R136	NDIPC4	Power consumption computation: Accumulated consumption of devices other than drive system 4(L)
R129		Power consumption computation: Accumulated consumption of entire drive system 4(H)	R137		Power consumption computation: Accumulated consumption of devices other than drive system 4(H)
R130	NDIPC1	Power consumption computation: Accumulated consumption of devices other than drive system 1(L)	R138		
R131		Power consumption computation: Accumulated consumption of devices other than drive system 1(H)	R139		
R132	NDIPC2	Power consumption computation: Accumulated consumption of devices other than drive system 2(L)	R140		
R133		Power consumption computation: Accumulated consumption of devices other than drive system 2(H)	R141		
R134	NDIPC3	Power consumption computation: Accumulated consumption of devices other than drive system 3(L)	R142		
R135		Power consumption computation: Accumulated consumption of devices other than drive system 3(H)	R143		
Device	**Abbrev.**	**Signal name**	**Device**	**Abbrev.**	**Signal name**
R160			R168		PLC axis alarm/warning No. 1st axis
R161			R169		PLC axis alarm/warning No. 2nd axis
R162			R170		PLC axis alarm/warning No. 3rd axis
R163			R171		PLC axis alarm/warning No. 4th axis
R164			R172		PLC axis alarm/warning No. 5th axis
R165			R173		PLC axis alarm/warning No. 6th axis
R166			R174		
R167			R175		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R500	R700	R900	R1100	R1300	R1500	R1700	R1900		External search status
R501	R701	R901	R1101	R1301	R1501	R1701	R1901		
R502	R702	R902	R1102	R1302	R1502	R1702	R1902		
R503	R703	R903	R1103	R1303	R1503	R1703	R1903		
R504	R704	R904	R1104	R1304	R1504	R1704	R1904		M code data 1 (L)
R505	R705	R905	R1105	R1305	R1505	R1705	R1905		M code data 1 (H)
R506	R706	R906	R1106	R1306	R1506	R1706	R1906		M code data 2 (L)
R507	R707	R907	R1107	R1307	R1507	R1707	R1907		M code data 2 (H)

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R508	R708	R908	R1108	R1308	R1508	R1708	R1908		M code data 3 (L)
R509	R709	R909	R1109	R1309	R1509	R1709	R1909		M code data 3 (H)
R510	R710	R910	R1110	R1310	R1510	R1710	R1910		M code data 4 (L)
R511	R711	R911	R1111	R1311	R1511	R1711	R1911		M code data 4 (H)
R512	R712	R912	R1112	R1312	R1512	R1712	R1912		S code data 1 (L)
R513	R713	R913	R1113	R1313	R1513	R1713	R1913		S code data 1 (H)
R514	R714	R914	R1114	R1314	R1514	R1714	R1914		S code data 2 (L)
R515	R715	R915	R1115	R1315	R1515	R1715	R1915		S code data 2 (H)

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R516	R716	R916	R1116	R1316	R1516	R1716	R1916		S code data 3 (L)
R517	R717	R917	R1117	R1317	R1517	R1717	R1917		S code data 3 (H)
R518	R718	R918	R1118	R1318	R1518	R1718	R1918		S code data 4 (L)
R519	R719	R919	R1119	R1319	R1519	R1719	R1919		S code data 4 (H)
R520	R720	R920	R1120	R1320	R1520	R1720	R1920		S code data 5 (L)
R521	R721	R921	R1121	R1321	R1521	R1721	R1921		S code data 5 (H)
R522	R722	R922	R1122	R1322	R1522	R1722	R1922		S code data 6 (L)
R523	R723	R923	R1123	R1323	R1523	R1723	R1923		S code data 6 (H)

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R524	R724	R924	R1124	R1324	R1524	R1724	R1924		S code data 7 (L)
R525	R725	R925	R1125	R1325	R1525	R1725	R1925		S code data 7 (H)
R526	R726	R926	R1126	R1326	R1526	R1726	R1926		S code data 8 (L)
R527	R727	R927	R1127	R1327	R1527	R1727	R1927		S code data 8 (H)
R528	R728	R928	R1128	R1328	R1528	R1728	R1928		
R529	R729	R929	R1129	R1329	R1529	R1729	R1929		
R530	R730	R930	R1130	R1330	R1530	R1730	R1930		
R531	R731	R931	R1131	R1331	R1531	R1731	R1931		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R532	R732	R932	R1132	R1332	R1532	R1732	R1932		
R533	R733	R933	R1133	R1333	R1533	R1733	R1933		
R534	R734	R934	R1134	R1334	R1534	R1734	R1934		
R535	R735	R935	R1135	R1335	R1535	R1735	R1935		
R536	R736	R936	R1136	R1336	R1536	R1736	R1936		T code data 1 (L)
R537	R737	R937	R1137	R1337	R1537	R1737	R1937		T code data 1 (H)
R538	R738	R938	R1138	R1338	R1538	R1738	R1938		T code data 2 (L)
R539	R739	R939	R1139	R1339	R1539	R1739	R1939		T code data 2 (H)

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R540	R740	R940	R1140	R1340	R1540	R1740	R1940		T code data 3 (L)
R541	R741	R941	R1141	R1341	R1541	R1741	R1941		T code data 3 (H)
R542	R742	R942	R1142	R1342	R1542	R1742	R1942		T code data 4 (L)
R543	R743	R943	R1143	R1343	R1543	R1743	R1943		T code data 4 (H)
R544	R744	R944	R1144	R1344	R1544	R1744	R1944		2nd M function data 1 (L)
R545	R745	R945	R1145	R1345	R1545	R1745	R1945		2nd M function data 1 (H)
R546	R746	R946	R1146	R1346	R1546	R1746	R1946		2nd M function data 2 (L)
R547	R747	R947	R1147	R1347	R1547	R1747	R1947		2nd M function data 2 (H)

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R548	R748	R948	R1148	R1348	R1548	R1748	R1948		2nd M function data 3 (L)
R549	R749	R949	R1149	R1349	R1549	R1749	R1949		2nd M function data 3 (H)
R550	R750	R950	R1150	R1350	R1550	R1750	R1950		2nd M function data 4 (L)
R551	R751	R951	R1151	R1351	R1551	R1751	R1951		2nd M function data 4 (H)
R552	R752	R952	R1152	R1352	R1552	R1752	R1952		
R553	R753	R953	R1153	R1353	R1553	R1753	R1953		
R554	R754	R954	R1154	R1354	R1554	R1754	R1954		Chopping error No.
R555	R755	R955	R1155	R1355	R1555	R1755	R1955		Manual measurement status

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R556	R756	R956	R1156	R1356	R1556	R1756	R1956		
R557	R757	R957	R1157	R1357	R1557	R1757	R1957		
R558	R758	R958	R1158	R1358	R1558	R1758	R1958		
R559	R759	R959	R1159	R1359	R1559	R1759	R1959		
R560	R760	R960	R1160	R1360	R1560	R1760	R1960		
R561	R761	R961	R1161	R1361	R1561	R1761	R1961		
R562	R762	R962	R1162	R1362	R1562	R1762	R1962		
R563	R763	R963	R1163	R1363	R1563	R1763	R1963		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R564	R764	R964	R1164	R1364	R1564	R1764	R1964		Load monitor I : Warning axis ▲
R565	R765	R965	R1165	R1365	R1565	R1765	R1965		Load monitor I : Alarm axis ▲
R566	R766	R966	R1166	R1366	R1566	R1766	R1966		Load monitor I : Data error information
R567	R767	R967	R1167	R1367	R1567	R1767	R1967		Group in tool life management
R568	R768	R968	R1168	R1368	R1568	R1768	R1968		
R569	R769	R969	R1169	R1369	R1569	R1769	R1969		
R570	R770	R970	R1170	R1370	R1570	R1770	R1970		
R571	R771	R971	R1171	R1371	R1571	R1771	R1971		Load monitor I : Adaptive control override ▲

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R572	R772	R972	R1172	R1372	R1572	R1772	R1972		CNC completion standby status
R573	R773	R973	R1173	R1373	R1573	R1773	R1973		
R574	R774	R974	R1174	R1374	R1574	R1774	R1974		In initialization
R575	R775	R975	R1175	R1375	R1575	R1775	R1975		Initialization incompletion
R576	R776	R976	R1176	R1376	R1576	R1776	R1976		Reference position adjustment value parameter setting completed
R577	R777	R977	R1177	R1377	R1577	R1777	R1977	APIER	User macro section and sub-section designated execution result
R578	R778	R978	R1178	R1378	R1578	R1778	R1978		Measurement tool tip point No. ▲
R579	R779	R979	R1179	R1379	R1579	R1779	R1979		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R580	R780	R980	R1180	R1380	R1580	R1780	R1980		Near reference position (per reference position) 1st to 4th axis
R581	R781	R981	R1181	R1381	R1581	R1781	R1981		Near reference position (per reference position) 5th to 8th axis
R582	R782	R982	R1182	R1382	R1582	R1782	R1982		Presetter contact
R583	R783	R983	R1183	R1383	R1583	R1783	R1983		Presetter interlock
R584	R784	R984	R1184	R1384	R1584	R1784	R1984		Area signal X axis ON/OFF ▲
R585	R785	R985	R1185	R1385	R1585	R1785	R1985		Area signal Z axis ON/OFF ▲
R586	R786	R986	R1186	R1386	R1586	R1786	R1986		Area signal X axis (-) ON/OFF ▲
R587	R787	R987	R1187	R1387	R1587	R1787	R1987		Area signal Z axis (-) ON/OFF ▲

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R588	R788	R988	R1188	R1388	R1588	R1788	R1988		Takt time (ms) (L)
R589	R789	R989	R1189	R1389	R1589	R1789	R1989		Takt time (ms) (H)
R590	R790	R990	R1190	R1390	R1590	R1790	R1990		Takt time (min) (L)
R591	R791	R991	R1191	R1391	R1591	R1791	R1991		Takt time (min) (H)
R592	R792	R992	R1192	R1392	R1592	R1792	R1992		
R593	R793	R993	R1193	R1393	R1593	R1793	R1993		
R594	R794	R994	R1194	R1394	R1594	R1794	R1994		
R595	R795	R995	R1195	R1395	R1595	R1795	R1995		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R596	R796	R996	R1196	R1396	R1596	R1796	R1996		Load monitor I : Status output (1) ▲
R597	R797	R997	R1197	R1397	R1597	R1797	R1997		Load monitor I : Status output (2) ▲
R598	R798	R998	R1198	R1398	R1598	R1798	R1998		Load monitor I : Status output (3) ▲
R599	R799	R999	R1199	R1399	R1599	R1799	R1999		Load monitor I : Status output (4) ▲
R600	R800	R1000	R1200	R1400	R1600	R1800	R2000		Load monitor I : Status output (5) ▲
R601	R801	R1001	R1201	R1401	R1601	R1801	R2001		Load monitor I : Status output (6) ▲
R602	R802	R1002	R1202	R1402	R1602	R1802	R2002		Load monitor I : Status output (7) ▲
R603	R803	R1003	R1203	R1403	R1603	R1803	R2003		Load monitor I : Status output (8) ▲

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R604	R804	R1004	R1204	R1404	R1604	R1804	R2004		Load monitor I : Status output (9) ▲
R605	R805	R1005	R1205	R1405	R1605	R1805	R2005		Load monitor I : Status output (10) ▲
R606	R806	R1006	R1206	R1406	R1606	R1806	R2006		No. of work machining (current value) (L)
R607	R807	R1007	R1207	R1407	R1607	R1807	R2007		No. of work machining (current value) (H)
R608	R808	R1008	R1208	R1408	R1608	R1808	R2008		No. of work machining (maximum value) (L)
R609	R809	R1009	R1209	R1409	R1609	R1809	R2009		No. of work machining (maximum value) (H)
R610	R810	R1010	R1210	R1410	R1610	R1810	R2010		
R611	R811	R1011	R1211	R1411	R1611	R1811	R2011		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R612	R812	R1012	R1212	R1412	R1612	R1812	R2012		
R613	R813	R1013	R1213	R1413	R1613	R1813	R2013		
R614	R814	R1014	R1214	R1414	R1614	R1814	R2014		
R615	R815	R1015	R1215	R1415	R1615	R1815	R2015		
R616	R816	R1016	R1216	R1416	R1616	R1816	R2016	SBSID	Sub part system control: Sub part system control II identification No.
R617	R817	R1017	R1217	R1417	R1617	R1817	R2017	SBSCL	Sub part system control: Calling sub part system
R618	R818	R1018	R1218	R1418	R1618	R1818	R2018	SBSWT	Sub part system control: Waiting for sub part system completion
R619	R819	R1019	R1219	R1419	R1619	R1819	R2019	SBSSY	Sub part system control: Caller of sub part system

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R620	R820	R1020	R1220	R1420	R1620	R1820	R2020		
R621	R821	R1021	R1221	R1421	R1621	R1821	R2021		
R622	R822	R1022	R1222	R1422	R1622	R1822	R2022		
R623	R823	R1023	R1223	R1423	R1623	R1823	R2023		
R624	R824	R1024	R1224	R1424	R1624	R1824	R2024		Constant torque control: Axis under constant torque/proportional torque stopper control
R625	R825	R1025	R1225	R1425	R1625	R1825	R2025		Constant torque control: Constant torque droop cancel axis status
R626	R826	R1026	R1226	R1426	R1626	R1826	R2026		
R627	R827	R1027	R1227	R1427	R1627	R1827	R2027		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R628	R828	R1028	R1228	R1428	R1628	R1828	R2028		Tool life usage data (L)
R629	R829	R1029	R1229	R1429	R1629	R1829	R2029		Tool life usage data (H)
R630	R830	R1030	R1230	R1430	R1630	R1830	R2030		Number of registered tool life control tools
R631	R831	R1031	R1231	R1431	R1631	R1831	R2031		
R632	R832	R1032	R1232	R1432	R1632	R1832	R2032		
R633	R833	R1033	R1233	R1433	R1633	R1833	R2033		
R634	R834	R1034	R1234	R1434	R1634	R1834	R2034		
R635	R835	R1035	R1235	R1435	R1635	R1835	R2035		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R636	R836	R1036	R1236	R1436	R1636	R1836	R2036		Circular feed in manual mode Current position X (L) [M]
R637	R837	R1037	R1237	R1437	R1637	R1837	R2037		Circular feed in manual mode Current position X (H) [M]
R638	R838	R1038	R1238	R1438	R1638	R1838	R2038		
R639	R839	R1039	R1239	R1439	R1639	R1839	R2039		
R640	R840	R1040	R1240	R1440	R1640	R1840	R2040		Circular feed in manual mode Current position Y (L) [M]
R641	R841	R1041	R1241	R1441	R1641	R1841	R2041		Circular feed in manual mode Current position Y (H) [M]
R642	R842	R1042	R1242	R1442	R1642	R1842	R2042		
R643	R843	R1043	R1243	R1443	R1643	R1843	R2043		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R644	R844	R1044	R1244	R1444	R1644	R1844	R2044		
R645	R845	R1045	R1245	R1445	R1645	R1845	R2045		
R646	R846	R1046	R1246	R1446	R1646	R1846	R2046		Machining mode state ▲
R647	R847	R1047	R1247	R1447	R1647	R1847	R2047		
R648	R848	R1048	R1248	R1448	R1648	R1848	R2048		Thread recutting status
R649	R849	R1049	R1249	R1449	R1649	R1849	R2049		Thread recutting execution status
R650	R850	R1050	R1250	R1450	R1650	R1850	R2050		Thread recutting spindle No.
R651	R851	R1051	R1251	R1451	R1651	R1851	R2051		Thread recutting lead axis No.

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R652	R852	R1052	R1252	R1452	R1652	R1852	R2052	TLMSLNO1	Censor ON Tool length compensation No. (BCD output) ▲
R653	R853	R1053	R1253	R1453	R1653	R1853	R2053	TLMSWNO1	Censor ON Tool wear compensation No. (BCD output) ▲
R654	R854	R1054	R1254	R1454	R1654	R1854	R2054	TLMSLNO2	Compensation data update Tool length compensation No. (BCD output) ▲
R655	R855	R1055	R1255	R1455	R1655	R1855	R2055	TLMSWNO2	Compensation data update Tool wear compensation No. (BCD output) ▲
R656	R856	R1056	R1256	R1456	R1656	R1856	R2056		
R657	R857	R1057	R1257	R1457	R1657	R1857	R2057		
R658	R858	R1058	R1258	R1458	R1658	R1858	R2058		
R659	R859	R1059	R1259	R1459	R1659	R1859	R2059		Ext. machine coordinate: number input compensation offset valid axis ▲

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R660	R860	R1060	R1260	R1460	R1660	R1860	R2060	RSWRK	R-Navi: selecting work number
R661	R861	R1061	R1261	R1461	R1661	R1861	R2061	RSSRF	R-Navi: selecting machine surface number
R662	R862	R1062	R1262	R1462	R1662	R1862	R2062		
R663	R863	R1063	R1263	R1463	R1663	R1863	R2063		
R664	R864	R1064	R1264	R1464	R1664	R1864	R2064		
R665	R865	R1065	R1265	R1465	R1665	R1865	R2065		
R666	R866	R1066	R1266	R1466	R1666	R1866	R2066		
R667	R867	R1067	R1267	R1467	R1667	R1867	R2067		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R668	R868	R1068	R1268	R1468	R1668	R1868	R2068	SVESTAF	Optimum acceleration/deceleration selection : NC axis estimated resonance frequency (in estimating inertia) ▲
R669	R869	R1069	R1269	R1469	R1669	R1869	R2069		
R670	R870	R1070	R1270	R1470	R1670	R1870	R2070		
R671	R871	R1071	R1271	R1471	R1671	R1871	R2071		
R672	R872	R1072	R1272	R1472	R1672	R1872	R2072		
R673	R873	R1073	R1273	R1473	R1673	R1873	R2073		
R674	R874	R1074	R1274	R1474	R1674	R1874	R2074		
R675	R875	R1075	R1275	R1475	R1675	R1875	R2075		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R684	R884	R1084	R1284	R1484	R1684	R1884	R2084		Specific user NC status 1 ▲
R685	R885	R1085	R1285	R1485	R1685	R1885	R2085		
R686	R886	R1086	R1286	R1486	R1686	R1886	R2086		
R687	R887	R1087	R1287	R1487	R1687	R1887	R2087		
R688	R888	R1088	R1288	R1488	R1688	R1888	R2088		Specific user Manual skip Axis in skip motion ▲
R689	R889	R1089	R1289	R1489	R1689	R1889	R2089		Specific user Manual skip Skip motion direction ▲
R690	R890	R1090	R1290	R1490	R1690	R1890	R2090		Specific user Error/Warning detail ▲
R691	R891	R1091	R1291	R1491	R1691	R1891	R2091		

Device	Abbrev.	Signal name	Device	Abbrev	Signal name
R2400		3D Machine Interference Check : Requested shape group No.1	R2408		
R2401		3D Machine Interference Check : Requested shape group No.2	R2409		
R2402		3D Machine Interference Check : Requested shape group No.3	R2410		
R2403		3D Machine Interference Check : Requested shape group No.4	R2411		
R2404			R2412		
R2405			R2413		
R2406			R2414		
R2407			R2415		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4500	R4532	R4564	R4596		Machine position 1st axis (L) [M]
R4501	R4533	R4565	R4597		Machine position 1st axis (H) [M]
R4502	R4534	R4566	R4598		
R4503	R4535	R4567	R4599		
R4504	R4536	R4568	R4600		Machine position 2nd axis (L) [M]
R4505	R4537	R4569	R4601		Machine position 2nd axis (H) [M]
R4506	R4538	R4570	R4602		
R4507	R4539	R4571	R4603		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4508	R4540	R4572	R4604		Machine position 3rd axis (L) [M]
R4509	R4541	R4573	R4605		Machine position 3rd axis (H) [M]
R4510	R4542	R4574	R4606		
R4511	R4543	R4575	R4607		
R4512	R4544	R4576	R4608		Machine position 4th axis (L) [M]
R4513	R4545	R4577	R4609		Machine position 4th axis (H) [M]
R4514	R4546	R4578	R4610		
R4515	R4547	R4579	R4611		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4516	R4548	R4580	R4612		Machine position 5th axis (L) [M]
R4517	R4549	R4581	R4613		Machine position 5th axis (H) [M]
R4518	R4550	R4582	R4614		
R4519	R4551	R4583	R4615		
R4520	R4552	R4584	R4616		Machine position 6th axis (L) [M]
R4521	R4553	R4585	R4617		Machine position 6th axis (H) [M]
R4522	R4554	R4586	R4618		
R4523	R4555	R4587	R4619		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4524	R4556	R4588	R4620		Machine position 7th axis (L) [M]
R4525	R4557	R4589	R4621		Machine position 7th axis (H) [M]
R4526	R4558	R4590	R4622		
R4527	R4559	R4591	R4623		
R4528	R4560	R4592	R4624		Machine position 8th axis (L) [M]
R4529	R4561	R4593	R4625		Machine position 8th axis (H) [M]
R4530	R4562	R4594	R4626		
R4531	R4563	R4595	R4627		

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4628	R4660	R4692	R4724		Feedback machine position 1st axis (L) [M]
R4629	R4661	R4693	R4725		Feedback machine position 1st axis (H) [M]
R4630	R4662	R4694	R4726		
R4631	R4663	R4695	R4727		
R4632	R4664	R4696	R4728		Feedback machine position 2nd axis (L) [M]
R4633	R4665	R4697	R4729		Feedback machine position 2nd axis (H) [M]
R4634	R4666	R4698	R4730		
R4635	R4667	R4699	R4731		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4636	R4668	R4700	R4732		Feedback machine position 3rd axis (L) [M]
R4637	R4669	R4701	R4733		Feedback machine position 3rd axis (H) [M]
R4638	R4670	R4702	R4734		
R4639	R4671	R4703	R4735		
R4640	R4672	R4704	R4736		Feedback machine position 4th axis (L) [M]
R4641	R4673	R4705	R4737		Feedback machine position 4th axis (H) [M]
R4642	R4674	R4706	R4738		
R4643	R4675	R4707	R4739		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4644	R4676	R4708	R4740		Feedback machine position 5th axis (L) [M]
R4645	R4677	R4709	R4741		Feedback machine position 5th axis (H) [M]
R4646	R4678	R4710	R4742		
R4647	R4679	R4711	R4743		
R4648	R4680	R4712	R4744		Feedback machine position 6th axis (L) [M]
R4649	R4681	R4713	R4745		Feedback machine position 6th axis (H) [M]
R4650	R4682	R4714	R4746		
R4651	R4683	R4715	R4747		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4652	R4684	R4716	R4748		Feedback machine position 7th axis (L) [M]
R4653	R4685	R4717	R4749		Feedback machine position 7th axis (H) [M]
R4654	R4686	R4718	R4750		
R4655	R4687	R4719	R4751		
R4656	R4688	R4720	R4752		Feedback machine position 8th axis (L) [M]
R4657	R4689	R4721	R4753		Feedback machine position 8th axis (H) [M]
R4658	R4690	R4722	R4754		
R4659	R4691	R4723	R4755		

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4756	R4772	R4788	R4804		Servo deflection amount 1st axis (L) [M]
R4757	R4773	R4789	R4805		Servo deflection amount 1st axis (H) [M]
R4758	R4774	R4790	R4806		Servo deflection amount 2nd axis (L) [M]
R4759	R4775	R4791	R4807		Servo deflection amount 2nd axis (H) [M]
R4760	R4776	R4792	R4808		Servo deflection amount 3rd axis (L) [M]
R4761	R4777	R4793	R4809		Servo deflection amount 3rd axis (H) [M]
R4762	R4778	R4794	R4810		Servo deflection amount 4th axis (L) [M]
R4763	R4779	R4795	R4811		Servo deflection amount 4th axis (H) [M]

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4764	R4780	R4796	R4812		Servo deflection amount 5th axis (L) [M]
R4765	R4781	R4797	R4813		Servo deflection amount 5th axis (H) [M]
R4766	R4782	R4798	R4814		Servo deflection amount 6th axis (L) [M]
R4767	R4783	R4799	R4815		Servo deflection amount 6th axis (H) [M]
R4768	R4784	R4800	R4816		Servo deflection amount 7th axis (L) [M]
R4769	R4785	R4801	R4817		Servo deflection amount 7th axis (H) [M]
R4770	R4786	R4802	R4818		Servo deflection amount 8th axis (L) [M]
R4771	R4787	R4803	R4819		Servo deflection amount 8th axis (H) [M]

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4820	R4836	R4852	R4868		Motor rotation speed 1st axis (L)
R4821	R4837	R4853	R4869		Motor rotation speed 1st axis (H)
R4822	R4838	R4854	R4870		Motor rotation speed 2nd axis (L)
R4823	R4839	R4855	R4871		Motor rotation speed 2nd axis (H)
R4824	R4840	R4856	R4872		Motor rotation speed 3rd axis (L)
R4825	R4841	R4857	R4873		Motor rotation speed 3rd axis (H)
R4826	R4842	R4858	R4874		Motor rotation speed 4th axis (L)
R4827	R4843	R4859	R4875		Motor rotation speed 4th axis (H)

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4828	R4844	R4860	R4876		Motor rotation speed 5th axis (L)
R4829	R4845	R4861	R4877		Motor rotation speed 5th axis (H)
R4830	R4846	R4862	R4878		Motor rotation speed 6th axis (L)
R4831	R4847	R4863	R4879		Motor rotation speed 6th axis (H)
R4832	R4848	R4864	R4880		Motor rotation speed 7th axis (L)
R4833	R4849	R4865	R4881		Motor rotation speed 7th axis (H)
R4834	R4850	R4866	R4882		Motor rotation speed 8th axis (L)
R4835	R4851	R4867	R4883		Motor rotation speed 8th axis (H)

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4884	R4900	R4916	R4932		Motor load current 1st axis (L)
R4885	R4901	R4917	R4933		Motor load current 1st axis (H)
R4886	R4902	R4918	R4934		Motor load current 2nd axis (L)
R4887	R4903	R4919	R4935		Motor load current 2nd axis (H)
R4888	R4904	R4920	R4936		Motor load current 3rd axis (L)
R4889	R4905	R4921	R4937		Motor load current 3rd axis (H)
R4890	R4906	R4922	R4938		Motor load current 4th axis (L)
R4891	R4907	R4923	R4939		Motor load current 4th axis (H)

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4892	R4908	R4924	R4940		Motor load current 5th axis (L)
R4893	R4909	R4925	R4941		Motor load current 5th axis (H)
R4894	R4910	R4926	R4942		Motor load current 6th axis (L)
R4895	R4911	R4927	R4943		Motor load current 6th axis (H)
R4896	R4912	R4928	R4944		Motor load current 7th axis (L)
R4897	R4913	R4929	R4945		Motor load current 7th axis (H)
R4898	R4914	R4930	R4946		Motor load current 8th axis (L)
R4899	R4915	R4931	R4947		Motor load current 8th axis (H)

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4948	R4980	R5012	R5044		Skip coordinate position 1st axis (L) [M]
R4949	R4981	R5013	R5045		Skip coordinate position 1st axis (H) [M]
R4950	R4982	R5014	R5046		
R4951	R4983	R5015	R5047		
R4952	R4984	R5016	R5048		Skip coordinate position 2nd axis (L) [M]
R4953	R4985	R5017	R5049		Skip coordinate position 2nd axis (H) [M]
R4954	R4986	R5018	R5050		
R4955	R4987	R5019	R5051		

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4956	R4988	R5020	R5052		Skip coordinate position 3rd axis (L) [M]
R4957	R4989	R5021	R5053		Skip coordinate position 3rd axis (H) [M]
R4958	R4990	R5022	R5054		
R4959	R4991	R5023	R5055		
R4960	R4992	R5024	R5056		Skip coordinate position 4th axis (L) [M]
R4961	R4993	R5025	R5057		Skip coordinate position 4th axis (H) [M]
R4962	R4994	R5026	R5058		
R4963	R4995	R5027	R5059		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4964	R4996	R5028	R5060		Skip coordinate position 5th axis (L) [M]
R4965	R4997	R5029	R5061		Skip coordinate position 5th axis (H) [M]
R4966	R4998	R5030	R5062		
R4967	R4999	R5031	R5063		
R4968	R5000	R5032	R5064		Skip coordinate position 6th axis (L) [M]
R4969	R5001	R5033	R5065		Skip coordinate position 6th axis (H) [M]
R4970	R5002	R5034	R5066		
R4971	R5003	R5035	R5067		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R4972	R5004	R5036	R5068		Skip coordinate position 7th axis (L) [M]
R4973	R5005	R5037	R5069		Skip coordinate position 7th axis (H) [M]
R4974	R5006	R5038	R5070		
R4975	R5007	R5039	R5071		
R4976	R5008	R5040	R5072		Skip coordinate position 8th axis (L) [M]
R4977	R5009	R5041	R5073		Skip coordinate position 8th axis (H) [M]
R4978	R5010	R5042	R5074		
R4979	R5011	R5043	R5075		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5076	R5092	R5108	R5124		Synchronous error amount 1st, 9th, 17th, 25th axis (L) [M]
R5077	R5093	R5109	R5125		Synchronous error amount 1st, 9th, 17th, 25th axis (H) [M]
R5078	R5094	R5110	R5126		Synchronous error amount 2nd, 10th, 18th, 26th axis (L) [M]
R5079	R5095	R5111	R5127		Synchronous error amount 2nd, 10th, 18th, 26th axis (H) [M]
R5080	R5096	R5112	R5128		Synchronous error amount 3rd, 11th, 19th, 27th axis (L) [M]
R5081	R5097	R5113	R5129		Synchronous error amount 3rd, 11th, 19th, 27th axis (H) [M]
R5082	R5098	R5114	R5130		Synchronous error amount 4th, 12th, 20th, 28th axis (L) [M]
R5083	R5099	R5115	R5131		Synchronous error amount 4th, 12th, 20th, 28th axis (H) [M]

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5084	R5100	R5116	R5132		Synchronous error amount 5th, 13th, 21st, 29th axis (L) [M]
R5085	R5101	R5117	R5133		Synchronous error amount 5th, 13th, 21st, 29th axis (H) [M]
R5086	R5102	R5118	R5134		Synchronous error amount 6th, 14th, 22nd, 30th axis (L) [M]
R5087	R5103	R5119	R5135		Synchronous error amount 6th, 14th, 22nd, 30th axis (H) [M]
R5088	R5104	R5120	R5136		Synchronous error amount 7th, 15th, 23rd, 31st axis (L) [M]
R5089	R5105	R5121	R5137		Synchronous error amount 7th, 15th, 23rd, 31st axis (H) [M]
R5090	R5106	R5122	R5138		Synchronous error amount 8th, 16th, 24th, 32nd axis (L) [M]
R5091	R5107	R5123	R5139		Synchronous error amount 8th, 16th, 24th, 32nd axis (H) [M]

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5140	R5148	R5156	R5164		Optimum acceleration/deceleration parameter group currently selected [axis] ▲ 1st axis
R5141	R5149	R5157	R5165		Optimum acceleration/deceleration parameter group currently selected [axis] ▲ 2nd axis
R5142	R5150	R5158	R5166		Optimum acceleration/deceleration parameter group currently selected [axis] ▲ 3rd axis
R5143	R5151	R5159	R5167		Optimum acceleration/deceleration parameter group currently selected [axis] ▲ 4th axis
R5144	R5152	R5160	R5168		Optimum acceleration/deceleration parameter group currently selected [axis] ▲ 5th axis
R5145	R5153	R5161	R5169		Optimum acceleration/deceleration parameter group currently selected [axis] ▲ 6th axis
R5146	R5154	R5162	R5170		Optimum acceleration/deceleration parameter group currently selected [axis] ▲ 7th axis
R5147	R5155	R5163	R5171		Optimum acceleration/deceleration parameter group currently selected [axis] ▲ 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5172	R5204	R5236	R5268		Cutting feed movement amount 1st axis (L) [M]
R5173	R5205	R5237	R5269		Cutting feed movement amount 1st axis (H) [M]
R5174	R5206	R5238	R5270		
R5175	R5207	R5239	R5271		
R5176	R5208	R5240	R5272		Cutting feed movement amount 2nd axis (L) [M]
R5177	R5209	R5241	R5273		Cutting feed movement amount 2nd axis (H) [M]
R5178	R5210	R5242	R5274		
R5179	R5211	R5243	R5275		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5180	R5212	R5244	R5276		Cutting feed movement amount 3rd axis (L) [M]
R5181	R5213	R5245	R5277		Cutting feed movement amount 3rd axis (H) [M]
R5182	R5214	R5246	R5278		
R5183	R5215	R5247	R5279		
R5184	R5216	R5248	R5280		Cutting feed movement amount 4th axis (L) [M]
R5185	R5217	R5249	R5281		Cutting feed movement amount 4th axis (H) [M]
R5186	R5218	R5250	R5282		
R5187	R5219	R5251	R5283		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5188	R5220	R5252	R5284		Cutting feed movement amount 5th axis (L) [M]
R5189	R5221	R5253	R5285		Cutting feed movement amount 5th axis (H) [M]
R5190	R5222	R5254	R5286		
R5191	R5223	R5255	R5287		
R5192	R5224	R5256	R5288		Cutting feed movement amount 6th axis (L) [M]
R5193	R5225	R5257	R5289		Cutting feed movement amount 6th axis (H) [M]
R5194	R5226	R5258	R5290		
R5195	R5227	R5259	R5291		

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5196	R5228	R5260	R5292		Cutting feed movement amount 7th axis (L) [M]
R5197	R5229	R5261	R5293		Cutting feed movement amount 7th axis (H) [M]
R5198	R5230	R5262	R5294		
R5199	R5231	R5263	R5295		
R5200	R5232	R5264	R5296		Cutting feed movement amount 8th axis (L) [M]
R5201	R5233	R5265	R5297		Cutting feed movement amount 8th axis (H) [M]
R5202	R5234	R5266	R5298		
R5203	R5235	R5267	R5299		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5300	R5308	R5316	R5324		
R5301	R5309	R5317	R5325		
R5302	R5310	R5318	R5326		
R5303	R5311	R5319	R5327		
R5304	R5312	R5320	R5328		
R5305	R5313	R5321	R5329		
R5306	R5314	R5322	R5330		
R5307	R5315	R5323	R5331		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5332	R5340	R5348	R5356		Servo alarm/warning No. 1st axis
R5333	R5341	R5349	R5357		Servo alarm/warning No. 2nd axis
R5334	R5342	R5350	R5358		Servo alarm/warning No. 3rd axis
R5335	R5343	R5351	R5359		Servo alarm/warning No. 4th axis
R5336	R5344	R5352	R5360		Servo alarm/warning No. 5th axis
R5337	R5345	R5353	R5361		Servo alarm/warning No. 6th axis
R5338	R5346	R5354	R5362		Servo alarm/warning No. 7th axis
R5339	R5347	R5355	R5363		Servo alarm/warning No. 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5364	R5396	R5428	R5460		Skip coordinate position 1st axis feature coordinate (L) [M]
R5365	R5397	R5429	R5461		Skip coordinate position 1st axis feature coordinate(H) [M]
R5366	R5398	R5430	R5462		
R5367	R5399	R5431	R5463		
R5368	R5400	R5432	R5464		Skip coordinate position 2nd axis feature coordinate (L) [M]
R5369	R5401	R5433	R5465		Skip coordinate position 2nd axis feature coordinate (H) [M]
R5370	R5402	R5434	R5466		
R5371	R5403	R5435	R5467		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5372	R5404	R5436	R5468		Skip coordinate position 3rd axis feature coordinate (L) [M]
R5373	R5405	R5437	R5469		Skip coordinate position 3rd axis feature coordinate (H) [M]
R5374	R5406	R5438	R5470		
R5375	R5407	R5439	R5471		
R5376	R5408	R5440	R5472		Skip coordinate position 4th axis feature coordinate (L) [M]
R5377	R5409	R5441	R5473		Skip coordinate position 4th axis feature coordinate (H) [M]
R5378	R5410	R5442	R5474		
R5379	R5411	R5443	R5475		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5380	R5412	R5444	R5476		Skip coordinate position 5th axis feature coordinate (L) [M]
R5381	R5413	R5445	R5477		Skip coordinate position 5th axis feature coordinate (H [M]
R5382	R5414	R5446	R5478		
R5383	R5415	R5447	R5479		
R5384	R5416	R5448	R5480		Skip coordinate position 6th axis feature coordinate (L) [M]
R5385	R5417	R5449	R5481		Skip coordinate position 6th axis feature coordinate (H) [M]
R5386	R5418	R5450	R5482		
R5387	R5419	R5451	R5483		

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5388	R5420	R5452	R5484		Skip coordinate position 7th axis feature coordinate (L) [M]
R5389	R5421	R5453	R5485		Skip coordinate position 7th axis feature coordinate (H) [M]
R5390	R5422	R5454	R5486		
R5391	R5423	R5455	R5487		
R5392	R5424	R5456	R5488		Skip coordinate position 8th axis feature coordinate (L) [M]
R5393	R5425	R5457	R5489		Skip coordinate position 8th axis feature coordinate (L) [M]
R5394	R5426	R5458	R5490		
R5395	R5427	R5459	R5491		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5492	R5500	R5508	R5516		Load monitor I : Cutting torque output value 1st axis
R5493	R5501	R5509	R5517		Load monitor I : Cutting torque output value 2nd axis
R5494	R5502	R5510	R5518		Load monitor I : Cutting torque output value 3rd axis
R5495	R5503	R5511	R5519		Load monitor I : Cutting torque output value 4th axis
R5496	R5504	R5512	R5520		Load monitor I : Cutting torque output value 5th axis
R5497	R5505	R5513	R5521		Load monitor I : Cutting torque output value 6th axis
R5498	R5506	R5514	R5522		Load monitor I : Cutting torque output value 7th axis
R5499	R5507	R5515	R5523		Load monitor I : Cutting torque output value 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5524	R5532	R5540	R5548		Actual machining time 1st axis ▲
R5525	R5533	R5541	R5549		Actual machining time 2nd axis ▲
R5526	R5534	R5542	R5550		Actual machining time 3rd axis ▲
R5527	R5535	R5543	R5551		Actual machining time 4th axis ▲
R5528	R5536	R5544	R5552		Actual machining time 5th axis ▲
R5529	R5537	R5545	R5553		Actual machining time 6th axis ▲
R5530	R5538	R5546	R5554		Actual machining time 7th axis ▲
R5531	R5539	R5547	R5555		Actual machining time 8h axis ▲

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5556	R5564	R5572	R5580	SVINER1	Optimum Acceleration/Deceleration Selection : NC axis estimated inertia ratio 1st axis ▲
R5557	R5565	R5573	R5581	SVINER2	Optimum Acceleration/Deceleration Selection : NC axis estimated inertia ratio 2nd axis ▲
R5558	R5566	R5574	R5582	SVINER3	Optimum Acceleration/Deceleration Selection : NC axis estimated inertia ratio 3rd axis ▲
R5559	R5567	R5575	R5583	SVINER4	Optimum Acceleration/Deceleration Selection : NC axis estimated inertia ratio 4th axis ▲
R5560	R5568	R5576	R5584	SVINER5	Optimum Acceleration/Deceleration Selection : NC axis estimated inertia ratio 5th axis ▲
R5561	R5569	R5577	R5585	SVINER6	Optimum Acceleration/Deceleration Selection : NC axis estimated inertia ratio 6th axis ▲
R5562	R5570	R5578	R5586	SVINER7	Optimum Acceleration/Deceleration Selection : NC axis estimated inertia ratio 7th axis ▲
R5563	R5571	R5579	R5587	SVINER8	Optimum Acceleration/Deceleration Selection : NC axis estimated inertia ratio 8th axis ▲

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5588	R5596	R5604	R5612	SVAFLT1	Optimum Acceleration/Deceleration Selection : NC axis estimated resonance frequency 1st axis ▲
R5589	R5597	R5605	R5613	SVAFLT2	Optimum Acceleration/Deceleration Selection : NC axis estimated resonance frequency 2nd axis ▲
R5590	R5598	R5606	R5614	SVAFLT3	Optimum Acceleration/Deceleration Selection : NC axis estimated resonance frequency 3rd axis ▲
R5591	R5599	R5607	R5615	SVAFLT4	Optimum Acceleration/Deceleration Selection : NC axis estimated resonance frequency 4th axis ▲
R5592	R5600	R5608	R5616	SVAFLT5	Optimum Acceleration/Deceleration Selection : NC axis estimated resonance frequency 5th axis ▲
R5593	R5601	R5609	R5617	SVAFLT6	Optimum Acceleration/Deceleration Selection : NC axis estimated resonance frequency 6th axis ▲
R5594	R5602	R5610	R5618	SVAFLT7	Optimum Acceleration/Deceleration Selection : NC axis estimated resonance frequency 7th axis ▲
R5595	R5603	R5611	R5619	SVAFLT8	Optimum Acceleration/Deceleration Selection : NC axis estimated resonance frequency 8th axis ▲

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5620	R5628	R5636	R5644		Load monitoring I: Effective torque output 1st axis
R5621	R5629	R5637	R5645		Load monitoring I: Effective torque output 2nd axis
R5622	R5630	R5638	R5646		Load monitoring I: Effective torque output 3rd axis
R5623	R5631	R5639	R5647		Load monitoring I: Effective torque output 4th axis
R5624	R5632	R5640	R5648		Load monitoring I: Effective torque output 5th axis
R5625	R5633	R5641	R5649		Load monitoring I: Effective torque output 6th axis
R5626	R5634	R5642	R5650		Load monitoring I: Effective torque output 7th axis
R5627	R5635	R5643	R5651		Load monitoring I: Effective torque output 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5652	R5660	R5668	R5676		
R5653	R5661	R5669	R5677		
R5654	R5662	R5670	R5678		
R5655	R5663	R5671	R5679		
R5656	R5664	R5672	R5680		
R5657	R5665	R5673	R5681		
R5658	R5666	R5674	R5682		
R5659	R5667	R5675	R5683		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R6372	R6380	R6388	R6396		User macro output #1132 (NC -> PLC) (L)
R6373	R6381	R6389	R6397		User macro output #1132 (NC -> PLC) (H)
R6374	R6382	R6390	R6398		User macro output #1133 (NC -> PLC) (L)
R6375	R6383	R6391	R6399		User macro output #1133 (NC -> PLC) (H)
R6376	R6384	R6392	R6400		User macro output #1134 (NC -> PLC) (L)
R6377	R6385	R6393	R6401		User macro output #1134 (NC -> PLC) (H)
R6378	R6386	R6394	R6402		User macro output #1135 (NC -> PLC) (L)
R6379	R6387	R6395	R6403		User macro output #1135 (NC -> PLC) (H)

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R6500	R6550	R6600	R6650	R6700	R6750	R6800	R6850		Spindle command rotation speed input (L)
R6501	R6551	R6601	R6651	R6701	R6751	R6801	R6851		Spindle command rotation speed input (H)
R6502	R6552	R6602	R6652	R6702	R6752	R6802	R6852		Spindle command final data (rotation speed) (L)
R6503	R6553	R6603	R6653	R6703	R6753	R6803	R6853		Spindle command final data (rotation speed) (H)
R6504	R6554	R6604	R6654	R6704	R6754	R6804	R6854		Spindle command final data (12-bit binary) (L)
R6505	R6555	R6605	R6655	R6705	R6755	R6805	R6855		Spindle command final data (12-bit binary) (H)
R6506	R6556	R6606	R6656	R6706	R6756	R6806	R6856		Spindle actual speed (L)
R6507	R6557	R6607	R6657	R6707	R6757	R6807	R6857		Spindle actual speed (H)

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R6508	R6558	R6608	R6658	R6708	R6758	R6808	R6858		
R6509	R6559	R6609	R6659	R6709	R6759	R6809	R6859		
R6510	R6560	R6610	R6660	R6710	R6760	R6810	R6860		
R6511	R6561	R6611	R6661	R6711	R6761	R6811	R6861		
R6512	R6562	R6612	R6662	R6712	R6762	R6812	R6862		
R6513	R6563	R6613	R6663	R6713	R6763	R6813	R6863		
R6514	R6564	R6614	R6664	R6714	R6764	R6814	R6864		Optimum acceleration/deceleration estimated inertia ratio [spindle] ▲
R6515	R6565	R6615	R6665	R6715	R6765	R6815	R6865		Optimum acceleration/deceleration parameter group currently selected [spindle] ▲

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R6516	R6566	R6616	R6666	R6716	R6766	R6816	R6866		Spindle synchronization phase error /Hob axis delay angle
R6517	R6567	R6617	R6667	R6717	R6767	R6817	R6867		Spindle synchronization Maximum phase error/ Maximum hob axis delay angle
R6518	R6568	R6618	R6668	R6718	R6768	R6818	R6868		Spindle synchronization Phase offset data
R6519	R6569	R6619	R6669	R6719	R6769	R6819	R6869		Spindle synchronization Phase error monitor
R6520	R6570	R6620	R6670	R6720	R6770	R6820	R6870		Spindle synchronization Phase error monitor (lower limit)
R6521	R6571	R6621	R6671	R6721	R6771	R6821	R6871		Spindle synchronization Phase error monitor (upper limit)
R6522	R6572	R6622	R6672	R6722	R6772	R6822	R6872		Spindle synchronization Phase error 1
R6523	R6573	R6623	R6673	R6723	R6773	R6823	R6873		Spindle synchronization Phase error 2

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R6524	R6574	R6624	R6674	R6724	R6774	R6824	R6874		
R6525	R6575	R6625	R6675	R6725	R6775	R6825	R6875		Spindle motor load ratio
R6526	R6576	R6626	R6676	R6726	R6776	R6826	R6876		
R6527	R6577	R6627	R6677	R6727	R6777	R6827	R6877		Spindle actual machining time ▲
R6528	R6578	R6628	R6678	R6728	R6778	R6828	R6878		Load monitor I : Spindle cutting torque output value
R6529	R6579	R6629	R6679	R6729	R6779	R6829	R6879		Spindle alarm/warning No.
R6530	R6580	R6630	R6680	R6730	R6780	R6830	R6880		
R6531	R6581	R6631	R6681	R6731	R6781	R6831	R6881		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R6532	R6582	R6632	R6682	R6732	R6782	R6832	R6882		Synchronous tapping Current error width (L)
R6533	R6583	R6633	R6683	R6733	R6783	R6833	R6883		Synchronous tapping Current error width (H)
R6534	R6584	R6634	R6684	R6734	R6784	R6834	R6884		Synchronous tapping Maximum error width (L)
R6535	R6585	R6635	R6685	R6735	R6785	R6835	R6885		Synchronous tapping Maximum error width (H)
R6536	R6586	R6636	R6686	R6736	R6786	R6836	R6886		Synchronous tapping Current error angle (L)
R6537	R6587	R6637	R6687	R6737	R6787	R6837	R6887		Synchronous tapping Current error angle (H)
R6538	R6588	R6638	R6688	R6738	R6788	R6838	R6888		Synchronous tapping Maximum error angle (L)
R6539	R6589	R6639	R6689	R6739	R6789	R6839	R6889		Synchronous tapping Maximum error angle (H)

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R6540	R6590	R6640	R6690	R6740	R6790	R6840	R6890		
R6541	R6591	R6641	R6691	R6741	R6791	R6841	R6891		Load monitoring I: Estimated spindle disturbance torque output
R6542	R6592	R6642	R6692	R6742	R6792	R6842	R6892		Load monitoring I: Effective spindle torque output
R6543	R6593	R6643	R6693	R6743	R6793	R6843	R6893		
R6544	R6594	R6644	R6694	R6744	R6794	R6844	R6894		
R6545	R6595	R6645	R6695	R6745	R6795	R6845	R6895		
R6546	R6596	R6646	R6696	R6746	R6796	R6846	R6896		
R6547	R6597	R6647	R6697	R6747	R6797	R6847	R6897		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10000		RIO1 No. of error occurrences 1st ch	R10008		RIO2 No. of error occurrences 1st ch
R10001		RIO1 No. of error occurrences 2nd ch	R10009		RIO2 No. of error occurrences 2nd ch
R10002		RIO1 No. of error occurrences 3rd ch	R10010		RIO2 No. of error occurrences 3rd ch
R10003		RIO1 No. of error occurrences 4th ch	R10011		RIO2 No. of error occurrences 4th ch
R10004		RIO1 No. of error occurrences 5th ch	R10012		RIO2 No. of error occurrences 5th ch
R10005		RIO1 No. of error occurrences 6th ch	R10013		RIO2 No. of error occurrences 6th ch
R10006		RIO1 No. of error occurrences 7th ch	R10014		RIO2 No. of error occurrences 7th ch
R10007		RIO1 No. of error occurrences 8th ch	R10015		RIO2 No. of error occurrences 8th ch

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10016		RIO3 No. of error occurrences 1st ch	R10024		
R10017		RIO3 No. of error occurrences 2nd ch	R10025		
R10018		RIO3 No. of error occurrences 3rd ch	R10026		
R10019		RIO3 No. of error occurrences 4th ch	R10027		
R10020		RIO3 No. of error occurrences 5th ch	R10028		
R10021		RIO3 No. of error occurrences 6th ch	R10029		
R10022		RIO3 No. of error occurrences 7th ch	R10030		
R10023		RIO3 No. of error occurrences 8th ch	R10031		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10064		Connection status of each channel RIO1,2	R10072		
R10065		Connection status of each channel RIO3	R10073		
R10066			R10074		
R10067			R10075		
R10068		CRC warning channel RIO1,2	R10076		
R10069		CRC warning channel RIO3	R10077		
R10070			R10078		
R10071			R10079		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
									T life mgmt (M system)
R11800	R11850	R11900	R11950	R12000	R12050	R12100	R12150		Spare tool: Group No. (L)
R11801	R11851	R11901	R11951	R12001	R12051	R12101	R12151		Spare tool: Group No. (H)
R11802	R11852	R11902	R11952	R12002	R12052	R12102	R12152		Spare tool: Tool No. (L)
R11803	R11853	R11903	R11953	R12003	R12053	R12103	R12153		Spare tool: Tool No. (H)
R11804	R11854	R11904	R11954	R12004	R12054	R12104	R12154		Spare tool: Tool data flag/Status
R11805	R11855	R11905	R11955	R12005	R12055	R12105	R12155		Spare tool: Auxiliary data
R11806	R11856	R11906	R11956	R12006	R12056	R12106	R12156		Spare tool: Cumulative usage time (L)
R11807	R11857	R11907	R11957	R12007	R12057	R12107	R12157		Spare tool: Cumulative usage time (H)

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R11808	R11858	R11908	R11958	R12008	R12058	R12108	R12158		Spare tool: Service lifetime (L)
R11809	R11859	R11909	R11959	R12009	R12059	R12109	R12159		Spare tool: Service lifetime (H)
R11810	R11860	R11910	R11960	R12010	R12060	R12110	R12160		Spare tool: Cumulative usage count
R11811	R11861	R11911	R11961	R12011	R12061	R12111	R12161		Spare tool: Service life count
R11812	R11862	R11912	R11962	R12012	R12062	R12112	R12162		Spare tool: Cumulative usage wear amount (L)
R11813	R11863	R11913	R11963	R12013	R12063	R12113	R12163		Spare tool: Cumulative usage wear amount (H)
R11814	R11864	R11914	R11964	R12014	R12064	R12114	R12164		Spare tool: Service life wear amount (L)
R11815	R11865	R11915	R11965	R12015	R12065	R12115	R12165		Spare tool: Service life wear amount (H)

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R11816	R11866	R11916	R11966	R12016	R12066	R12116	R12166		Spare tool: Length compensation amount (L)
R11817	R11867	R11917	R11967	R12017	R12067	R12117	R12167		Spare tool: Length compensation amount (H)
R11818	R11868	R11918	R11968	R12018	R12068	R12118	R12168		Spare tool: Radius compensation amount (L)
R11819	R11869	R11919	R11969	R12019	R12069	R12119	R12169		Spare tool: Radius compensation amount (H)
R11820	R11870	R11920	R11970	R12020	R12070	R12120	R12170		Spare tool: Length wear amount (L)
R11821	R11871	R11921	R11971	R12021	R12071	R12121	R12171		Spare tool: Length wear amount (H)
R11822	R11872	R11922	R11972	R12022	R12072	R12122	R12172		Spare tool: Radius wear amount (L)
R11823	R11873	R11923	R11973	R12023	R12073	R12123	R12173		Spare tool: Radius wear amount (H)

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
									T life mgmt (M system)
R11824	R11874	R11924	R11974	R12024	R12074	R12124	R12174		Active tool: Group No. (L)
R11825	R11875	R11925	R11975	R12025	R12075	R12125	R12175		Active tool: Group No. (H)
R11826	R11876	R11926	R11976	R12026	R12076	R12126	R12176		Active tool: Tool No. (L)
R11827	R11877	R11927	R11977	R12027	R12077	R12127	R12177		Active tool: Tool No. (H)
R11828	R11878	R11928	R11978	R12028	R12078	R12128	R12178		Active tool: Tool data flag/Status
R11829	R11879	R11929	R11979	R12029	R12079	R12129	R12179		Active tool: Auxiliary data
R11830	R11880	R11930	R11980	R12030	R12080	R12130	R12180		Active tool: Cumulative usage time (L)
R11831	R11881	R11931	R11981	R12031	R12081	R12131	R12181		Active tool: Cumulative usage time (H)

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R11832	R11882	R11932	R11982	R12032	R12082	R12132	R12182		Active tool: Service lifetime (L)
R11833	R11883	R11933	R11983	R12033	R12083	R12133	R12183		Active tool: Service lifetime (H)
R11834	R11884	R11934	R11984	R12034	R12084	R12134	R12184		Active tool: Cumulative usage count
R11835	R11885	R11935	R11985	R12035	R12085	R12135	R12185		Active tool: Service life count
R11836	R11886	R11936	R11986	R12036	R12086	R12136	R12186		Active tool: Cumulative usage wear amount (L)
R11837	R11887	R11937	R11987	R12037	R12087	R12137	R12187		Active tool: Cumulative usage wear amount (H)
R11838	R11888	R11938	R11988	R12038	R12088	R12138	R12188		Active tool: Service life wear amount (L)
R11839	R11889	R11939	R11989	R12039	R12089	R12139	R12189		Active tool: Service life wear amount (H)

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R11840	R11890	R11940	R11990	R12040	R12090	R12140	R12190		Active tool: Length compensation amount (L)
R11841	R11891	R11941	R11991	R12041	R12091	R12141	R12191		Active tool: Length compensation amount (H)
R11842	R11892	R11942	R11992	R12042	R12092	R12142	R12192		Active tool: Radius compensation amount (L)
R11843	R11893	R11943	R11993	R12043	R12093	R12143	R12193		Active tool: Radius compensation amount (H)
R11844	R11894	R11944	R11994	R12044	R12094	R12144	R12194		Active tool: Length wear amount (L)
R11845	R11895	R11945	R11995	R12045	R12095	R12145	R12195		Active tool: Length wear amount (H)
R11846	R11896	R11946	R11996	R12046	R12096	R12146	R12196		Active tool: Radius wear amount (L)
R11847	R11897	R11947	R11997	R12047	R12097	R12147	R12197		Active tool: Radius wear amount (H)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14000		EcoMonitorLight connection: Station #1 consumed power	R14008		
R14001			R14009		
R14002		EcoMonitorLight connection: Station #1 regenerated power	R14010		EcoMonitorLight connection: Station #2 consumed power
R14003			R14011		
R14004			R14012		EcoMonitorLight connection: Station #2 regenerated power
R14005			R14013		
R14006			R14014		
R14007			R14015		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14016			R14024		
R14017			R14025		
R14018			R14026		
R14019			R14027		
R14020		EcoMonitorLight connection: Station #3 consumed power	R14028		
R14021			R14029		
R14022		EcoMonitorLight connection: Station #3 regenerated power	R14030		EcoMonitorLight connection: Station #4 consumed power
R14023			R14031		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14032		EcoMonitorLight connection: Station #4 regenerated power	R14040		EcoMonitorLight connection: Station #5 consumed power
R14033			R14041		
R14034			R14042		EcoMonitorLight connection: Station #5 regenerated power
R14035			R14043		
R14036			R14044		
R14037			R14045		
R14038			R14046		
R14039			R14047		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14048			R14056		
R14049			R14057		
R14050		EcoMonitorLight connection: Station #6 consumed power	R14058		
R14051			R14059		
R14052		EcoMonitorLight connection: Station #6 regenerated power	R14060		EcoMonitorLight connection: Station #7 consumed power
R14053			R14061		
R14054			R14062		EcoMonitorLight connection: Station #7 regenerated power
R14055			R14063		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14064			R14072		EcoMonitorLight connection: Station #8 regenerated power
R14065			R14073		
R14066			R14074		
R14067			R14075		
R14068			R14076		
R14069			R14077		
R14070		EcoMonitorLight connection: Station #8 consumed power	R14078		
R14071			R14079		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14080		EcoMonitorLight connection: Station #9 consumed power	R14088		
R14081			R14089		
R14082		EcoMonitorLight connection: Station #9 regenerated power	R14090		EcoMonitorLight connection: Station #10 consumed power
R14083			R14091		
R14084			R14092		EcoMonitorLight connection: Station #10 regenerated power
R14085			R14093		
R14086			R14094		
R14087			R14095		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14096			R14104		
R14097			R14105		
R14098			R14106		
R14099			R14107		
R14100		EcoMonitorLight connection: Station #11 consumed power	R14108		
R14101			R14109		
R14102		EcoMonitorLight connection: Station #11 regenerated power	R14110		EcoMonitorLight connection: Station #12 consumed power
R14103			R14111		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14112		EcoMonitorLight connection: Station #12 regenerated power	R14120		EcoMonitorLight connection: Station #13 consumed power
R14113			R14121		
R14114			R14122		EcoMonitorLight connection: Station #13 regenerated power
R14115			R14123		
R14116			R14124		
R14117			R14125		
R14118			R14126		
R14119			R14127		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14128			R14136		
R14129			R14137		
R14130		EcoMonitorLight connection: Station #14 consumed power	R14138		
R14131			R14139		
R14132		EcoMonitorLight connection: Station #14 regenerated power	R14140		EcoMonitorLight connection: Station #15 consumed power
R14133			R14141		
R14134			R14142		EcoMonitorLight connection: Station #15 regenerated power
R14135			R14143		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14144			R14152		EcoMonitorLight connection: Station #16 regenerated power
R14145			R14153		
R14146			R14154		
R14147			R14155		
R14148			R14156		
R14149			R14157		
R14150		EcoMonitorLight connection: Station #16 consumed power	R14158		
R14151			R14159		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14192			R14200		EcoMonitorLight connection: Station #1 number of reception errors
R14193			R14201		EcoMonitorLight connection: Station #1 maximum number of successive reception errors
R14194			R14202		EcoMonitorLight connection: Station #1 number of transmission errors
R14195			R14203		EcoMonitorLight connection: Station #1 maximum number of successive transmission errors
R14196			R14204		
R14197			R14205		
R14198			R14206		
R14199			R14207		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14208			R14216		
R14209			R14217		
R14210		EcoMonitorLight connection: Station #2 number of reception errors	R14218		
R14211		EcoMonitorLight connection: Station #2 maximum number of successive reception errors	R14219		
R14212		EcoMonitorLight connection: Station #2 number of transmission errors	R14220		EcoMonitorLight connection: Station #3 number of reception errors
R14213		EcoMonitorLight connection: Station #2 maximum number of successive transmission errors	R14221		EcoMonitorLight connection: Station #3 maximum number of successive reception errors
R14214			R14222		EcoMonitorLight connection: Station #3 number of transmission errors
R14215			R14223		EcoMonitorLight connection: Station #3 maximum number of successive transmission errors

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14224			R14232		EcoMonitorLight connection: Station #4 number of transmission errors
R14225			R14233		EcoMonitorLight connection: Station #4 maximum number of successive transmission errors
R14226			R14234		
R14227			R14235		
R14228			R14236		
R14229			R14237		
R14230		EcoMonitorLight connection: Station #4 number of reception errors	R14238		
R14231		EcoMonitorLight connection: Station #4 maximum number of successive reception errors	R14239		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14240		EcoMonitorLight connection: Station #5 number of reception errors	R14248		
R14241		EcoMonitorLight connection: Station #5 maximum number of successive reception errors	R14249		
R14242		EcoMonitorLight connection: Station #5 number of transmission errors	R14250		EcoMonitorLight connection: Station #6 number of reception errors
R14243		EcoMonitorLight connection: Station #5 maximum number of successive transmission errors	R14251		EcoMonitorLight connection: Station #6 maximum number of successive reception errors
R14244			R14252		EcoMonitorLight connection: Station #6 number of transmission errors
R14245			R14253		EcoMonitorLight connection: Station #6 maximum number of successive transmission errors
R14246			R14254		
R14247			R14255		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14256			R14264		
R14257			R14265		
R14258			R14266		
R14259			R14267		
R14260		EcoMonitorLight connection: Station #7 number of reception errors	R14268		
R14261		EcoMonitorLight connection: Station #7 maximum number of successive reception errors	R14269		
R14262		EcoMonitorLight connection: Station #7 number of transmission errors	R14270		EcoMonitorLight connection: Station #8 number of reception errors
R14263		EcoMonitorLight connection: Station #7 maximum number of successive transmission errors	R14271		EcoMonitorLight connection: Station #8 maximum number of successive reception errors

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14272		EcoMonitorLight connection: Station #8 number of transmission errors	R14280		EcoMonitorLight connection: Station #9 number of reception errors
R14273		EcoMonitorLight connection: Station #8 maximum number of successive transmission errors	R14281		EcoMonitorLight connection: Station #9 maximum number of successive reception errors
R14274			R14282		EcoMonitorLight connection: Station #9 number of transmission errors
R14275			R14283		EcoMonitorLight connection: Station #9 maximum number of successive transmission errors
R14276			R14284		
R14277			R14285		
R14278			R14286		
R14279			R14287		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14288			R14296		
R14289			R14297		
R14290		EcoMonitorLight connection: Station #10 number of reception errors	R14298		
R14291		EcoMonitorLight connection: Station #10 maximum number of successive reception errors	R14299		
R14292		EcoMonitorLight connection: Station #10 number of transmission errors	R14300		EcoMonitorLight connection: Station #11 number of reception errors
R14293		EcoMonitorLight connection: Station #10 maximum number of successive transmission errors	R14301		EcoMonitorLight connection: Station #11 maximum number of successive reception errors
R14294			R14302		EcoMonitorLight connection: Station #11 number of transmission errors
R14295			R14303		EcoMonitorLight connection: Station #11 maximum number of successive transmission errors

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14304			R14312		EcoMonitorLight connection: Station #12 number of transmission errors
R14305			R14313		EcoMonitorLight connection: Station #12 maximum number of successive transmission errors
R14306			R14314		
R14307			R14315		
R14308			R14316		
R14309			R14317		
R14310		EcoMonitorLight connection: Station #12 number of reception errors	R14318		
R14311		EcoMonitorLight connection: Station #12 maximum number of successive reception errors	R14319		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14320		EcoMonitorLight connection: Station #13 number of reception errors	R14328		
R14321		EcoMonitorLight connection: Station #13 maximum number of successive reception errors	R14329		
R14322		EcoMonitorLight connection: Station #13 number of transmission errors	R14330		EcoMonitorLight connection: Station #14 number of reception errors
R14323		EcoMonitorLight connection: Station #13 maximum number of successive transmission errors	R14331		EcoMonitorLight connection: Station #14 maximum number of successive reception errors
R14324			R14332		EcoMonitorLight connection: Station #14 number of transmission errors
R14325			R14333		EcoMonitorLight connection: Station #14 maximum number of successive transmission errors
R14326			R14334		
R14327			R14335		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14336			R14344		
R14337			R14345		
R14338			R14346		
R14339			R14347		
R14340		EcoMonitorLight connection: Station #15 number of reception errors	R14348		
R14341		EcoMonitorLight connection: Station #15 maximum number of successive reception errors	R14349		
R14342		EcoMonitorLight connection: Station #15 number of transmission errors	R14350		EcoMonitorLight connection: Station #16 number of reception errors
R14343		EcoMonitorLight connection: Station #15 maximum number of successive transmission errors	R14351		EcoMonitorLight connection: Station #16 maximum number of successive reception errors

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14352		EcoMonitorLight connection: Station #16 number of transmission errors	R14360		
R14353		EcoMonitorLight connection: Station #16 maximum number of successive transmission errors	R14361		
R14354			R14362		
R14355			R14363		
R14356			R14364		
R14357			R14365		
R14358			R14366		
R14359			R14367		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14400		EcoMonitorLight connection: Completion bit			
R14401		EcoMonitorLight connection: Completion status			
R14402		EcoMonitorLight connection: Acquired data			
R14403					
R14404					
R14405					
R14406					
R14407					

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14500		MES interface library: Serial number	R14508		MES interface library: Serial number
R14501			R14509		
R14502			R14510		
R14503			R14511		
R14504			R14512		
R14505			R14513		
R14506			R14514		
R14507			R14515		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14516		MES interface library: Serial number	R14524		MES interface library: Serial number
R14517			R14525		
R14518			R14526		
R14519			R14527		
R14520			R14528		
R14521			R14529		
R14522			R14530		
R14523			R14531		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14532		MES interface library: Operator ID	R14540		MES interface library: Operator ID
R14533			R14541		
R14534			R14542		
R14535			R14543		
R14536			R14544		
R14537			R14545		
R14538			R14546		
R14539			R14547		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14548		MES interface library: Operator ID	R14556		MES interface library: Operator ID
R14549			R14557		
R14550			R14558		
R14551			R14559		
R14552			R14560		
R14553			R14561		
R14554			R14562		
R14555			R14563		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14564		MES interface library: NC unit number	R14572		MES interface library: Line number
R14565			R14573		
R14566			R14574		
R14567			R14575		
R14568			R14576		
R14569			R14577		
R14570			R14578		
R14571			R14579		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14580		MES interface library: Line number	R14588		MES interface library: Machine type
R14581			R14589		MES interface library: DB connection status
R14582			R14590		MES interface library: MES event command info (Registration request register)
R14583			R14591		MES interface library: MES app status info (Registration reception register)
R14584			R14592		MES interface library: MES app result register
R14585			R14593		
R14586			R14594		
R14587			R14595		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R14596		MES interface library: MES app result register	R14604		
R14597			R14605		
R14598			R14606		
R14599			R14607		
R14600			R14608		
R14601			R14609		
R14602			R14610		
R14603			R14611		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R20000	FLSYSM	FL-net : System monitor ▲	R20008	RULS	FL-net : Upper layer status of reference node ▲
R20001	LNA	FL-net : Local node address ▲	R20009	RCAD1	FL-net : Common memory area 1 data top address of reference node ▲
R20002	LULS	FL-net : Upper layer status of local node ▲	R20010	RCSZ1	FL-net : Common memory area 1 data size of reference node ▲
R20003	LLKS	FL-net : Link status of local node ▲	R20011	RCAD2	FL-net : Common memory area 2 data top address of reference node ▲
R20004	LSTS	FL-net : Status of local node ▲	R20012	RCSZ2	FL-net : Common memory area 2 data size of reference node ▲
R20005	PNADSP	FL-net : Participating node top address on display ▲	R20013	RLKS	FFL-net : Link status of reference node ▲
R20006	PNALST	FL-net : List of participating nodes ▲	R20014	RMFT	FL-net : Allowable minimum frame interval time of reference node ▲
R20007	RNADSP	FL-net : Reference node address on display ▲	R20015	RCTNOW	FL-net : Present value of refresh cycle measurement time ▲

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R20016	RVCYR	FL-net : API return value of cyclic transmission read ▲	R20024		
R20017	RVCYW	FL-net : API return value of cyclic transmission write ▲	R20025		
R20018			R20026		
R20019			R20027		
R20020			R20028		
R20021			R20029		
R20022			R20030		
R20023			R20031		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R20516	R20716	R20916	R21116	R21316	R21516	R21716	R21916		Appropriate machining diagnosis error axis ▲
R20517	R20717	R20917	R21117	R21317	R21517	R21717	R21917	TRTNCNT	Tool retract and return 2 : Number of transit points stored ▲
R20518	R20718	R20918	R21118	R21318	R21518	R21718	R21918		
R20519	R20719	R20919	R21119	R21319	R21519	R21719	R21919		
R20520	R20720	R20920	R21120	R21320	R21520	R21720	R21920		
R20521	R20721	R20921	R21121	R21321	R21521	R21721	R21921		
R20522	R20722	R20922	R21122	R21322	R21522	R21722	R21922		
R20523	R20723	R20923	R21123	R21323	R21523	R21723	R21923		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R20532	R20732	R20932	R21132	R21332	R21532	R21732	R21932		
R20533	R20733	R20933	R21133	R21333	R21533	R21733	R21933		
R20534	R20734	R20934	R21134	R21334	R21534	R21734	R21934		
R20535	R20735	R20935	R21135	R21335	R21535	R21735	R21935		
R20536	R20736	R20936	R21136	R21336	R21536	R21736	R21936		L system T code data
R20537	R20737	R20937	R21137	R21337	R21537	R21737	R21937		
R20538	R20738	R20938	R21138	R21338	R21538	R21738	R21938		
R20539	R20739	R20939	R21139	R21339	R21539	R21739	R21939		

2.3 PLC Output Signals (Bit type: Y***)

(Note) Signals with " ▲ " are prepared for specific machine tool builders.

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
Y700	IPCC1	Power consumption computation: Clear consumption accumulation 1	Y708	*KEY1	Data protect key 1
Y701	IPCC2	Power consumption computation: Clear consumption accumulation 2	Y709	*KEY2	Data protect key 2
Y702	IPCC3	Power consumption computation: Clear consumption accumulation 3	Y70A	*KEY3	Data protect key 3
Y703	IPCC4	Power consumption computation: Clear consumption accumulation 4	Y70B		
Y704	RHD1	Integration time input 1	Y70C	PDISP	Program display during operation ▲
Y705	RHD2	Integration time input 2	Y70D		Handle pulse encoder communication connector priority
Y706	MDBUSRST1	Modbus Time-out 1 cancel ▲	Y70E		
Y707	MDBUSRST2	Modbus Time-out 2 cancel ▲	Y70F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
Y710			Y718	*PCD1	PLC axis near point detection 1st axis
Y711		Optimum acceleration/deceleration parameter switch request [spindle] ▲	Y719	*PCD2	PLC axis near point detection 2nd axis
Y712			Y71A	*PCD3	PLC axis near point detection 3rd axis
Y713			Y71B	*PCD4	PLC axis near point detection 4th axis
Y714			Y71C	*PCD5	PLC axis near point detection 5th axis
Y715			Y71D	*PCD6	PLC axis near point detection 6th axis
Y716			Y71E		
Y717			Y71F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
Y720	HS1P	PLC axis 1st handle valid	Y728	CRTFN	CRT changeover completion
Y721	HS2P	PLC axis 2nd handle valid	Y729	SCRON	Screen display request
Y722	HS3P	PLC axis 3rd handle valid	Y72A		
Y723		PLC axis control buffering mode valid	Y72B		Collecting diagnosis data stop
Y724	IPCE1	Power consumption computation: Enable consumption accumulation 1	Y72C	SMPTRG	NC data sampling trigger
Y725	IPCE2	Power consumption computation: Enable consumption accumulation 2	Y72D		
Y726	IPCE3	Power consumption computation: Enable consumption accumulation 3	Y72E		Pallet program registration In APC execution
Y727	IPCE4	Power consumption computation: Enable consumption accumulation 4	Y72F		Pallet program registration Ext. workpiece coordinate transfer ready

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
Y730	DISP1	Display changeover $1	Y738		
Y731	DISP2	Display changeover $2	Y739		
Y732	DISP3	Display changeover $3	Y73A	MSBK	Single block with part systems synchronized
Y733	DISP4	Display changeover $4	Y73B		
Y734	DISP5	Display changeover $5	Y73C	MORR	Manual arbitrary reverse run mode
Y735	DISP6	Display changeover $6	Y73D	MORSP	Manual arbitrary reverse run speed selection
Y736	DISP7	Display changeover $7	Y73E	SMLK	High-speed simple program check mode
Y737	DISP8	Display changeover $8	Y73F	CCHK	Interference check valid

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
Y740		Tool IC new read ▲	Y748		PLC skip 1
Y741		Tool IC exchange read ▲	Y749		PLC skip 2
Y742	MCT	Contactor shutoff test	Y74A		PLC skip 3
Y743			Y74B		PLC skip 4
Y744			Y74C		PLC skip 5
Y745			Y74D		PLC skip 6
Y746			Y74E		PLC skip 7
Y747		Turret interference check valid	Y74F		PLC skip 8

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
Y750			Y758		
Y751			Y759		
Y752			Y75A		
Y753			Y75B		
Y754			Y75C		
Y755			Y75D		Automatic power OFF request
Y756			Y75E		
Y757			Y75F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
Y760			Y768		Door open I
Y761	MRCMD	Actual cutting mode (thread, tap) in manual arbitrary reverse run	Y769		
Y762			Y76A		
Y763			Y76B	SPSC	High-speed simple program check: Enable coordinate position check
Y764		Encoder 1 arbitrary pulse selection	Y76C		Remote program input start ▲
Y765		Encoder 2 arbitrary pulse selection	Y76D		Tool ID data read ▲
Y766		Encoder 1 arbitrary pulse valid	Y76E		Tool ID data write ▲
Y767		Encoder 2 arbitrary pulse valid	Y76F		Tool ID data erase ▲

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
Y770		PLC axis control valid 1st axis	Y778	GBON	G/B spindle synchronization valid
Y771		PLC axis control valid 2nd axis	Y779		
Y772		PLC axis control valid 3rd axis	Y77A	GBPHS	G/B spindle synchronization: phase alignment
Y773		PLC axis control valid 4th axis	Y77B	GBPHM	G/B spindle synchronization: phase memory
Y774		PLC axis control valid 5th axis	Y77C	GBCMON	G/B spindle synchronization: position error compensation
Y775		PLC axis control valid 6th axis	Y77D	GBOFF	G/B spindle synchronization: temporary cancel
Y776			Y77E	GBCMKP	G/B spindle synchronization: keep position error compensation amount signal
Y777			Y77F		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y780	Y788	Y790	Y798	DTCH1	Control axis detach 1st axis
Y781	Y789	Y791	Y799	DTCH2	Control axis detach 2nd axis
Y782	Y78A	Y792	Y79A	DTCH3	Control axis detach 3rd axis
Y783	Y78B	Y793	Y79B	DTCH4	Control axis detach 4th axis
Y784	Y78C	Y794	Y79C	DTCH5	Control axis detach 5th axis
Y785	Y78D	Y795	Y79D	DTCH6	Control axis detach 6th axis
Y786	Y78E	Y796	Y79E	DTCH7	Control axis detach 7th axis
Y787	Y78F	Y797	Y79F	DTCH8	Control axis detach 8th axis
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y7A0	Y7A8	Y7B0	Y7B8	*SVF1	Servo OFF 1st axis
Y7A1	Y7A9	Y7B1	Y7B9	*SVF2	Servo OFF 2nd axis
Y7A2	Y7AA	Y7B2	Y7BA	*SVF3	Servo OFF 3rd axis
Y7A3	Y7AB	Y7B3	Y7BB	*SVF4	Servo OFF 4th axis
Y7A4	Y7AC	Y7B4	Y7BC	*SVF5	Servo OFF 5th axis
Y7A5	Y7AD	Y7B5	Y7BD	*SVF6	Servo OFF 6th axis
Y7A6	Y7AE	Y7B6	Y7BE	*SVF7	Servo OFF 7th axis
Y7A7	Y7AF	Y7B7	Y7BF	*SVF8	Servo OFF 8th axis
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y7C0	Y7C8	Y7D0	Y7D8	MI1	Mirror image 1st axis
Y7C1	Y7C9	Y7D1	Y7D9	MI2	Mirror image 2nd axis
Y7C2	Y7CA	Y7D2	Y7DA	MI3	Mirror image 3rd axis
Y7C3	Y7CB	Y7D3	Y7DB	MI4	Mirror image 4th axis
Y7C4	Y7CC	Y7D4	Y7DC	MI5	Mirror image 5th axis
Y7C5	Y7CD	Y7D5	Y7DD	MI6	Mirror image 6th axis
Y7C6	Y7CE	Y7D6	Y7DE	MI7	Mirror image 7th axis
Y7C7	Y7CF	Y7D7	Y7DF	MI8	Mirror image 8th axis
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y7E0	Y7E8	Y7F0	Y7F8	*+EDT1	External deceleration+ 1st axis
Y7E1	Y7E9	Y7F1	Y7F9	*+EDT2	External deceleration+ 2nd axis
Y7E2	Y7EA	Y7F2	Y7FA	*+EDT3	External deceleration+ 3rd axis
Y7E3	Y7EB	Y7F3	Y7FB	*+EDT4	External deceleration+ 4th axis
Y7E4	Y7EC	Y7F4	Y7FC	*+EDT5	External deceleration+ 5th axis
Y7E5	Y7ED	Y7F5	Y7FD	*+EDT6	External deceleration+ 6th axis
Y7E6	Y7EE	Y7F6	Y7FE	*+EDT7	External deceleration+ 7th axis
Y7E7	Y7EF	Y7F7	Y7FF	*+EDT8	External deceleration+ 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y800	Y808	Y810	Y818	*-EDT1	External deceleration- 1st axis
Y801	Y809	Y811	Y819	*-EDT2	External deceleration- 2nd axis
Y802	Y80A	Y812	Y81A	*-EDT3	External deceleration- 3rd axis
Y803	Y80B	Y813	Y81B	*-EDT4	External deceleration- 4th axis
Y804	Y80C	Y814	Y81C	*-EDT5	External deceleration- 5th axis
Y805	Y80D	Y815	Y81D	*-EDT6	External deceleration- 6th axis
Y806	Y80E	Y816	Y81E	*-EDT7	External deceleration- 7th axis
Y807	Y80F	Y817	Y81F	*-EDT8	External deceleration- 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y820	Y828	Y830	Y838	*+AIT1	Automatic interlock+ 1st axis
Y821	Y829	Y831	Y839	*+AIT2	Automatic interlock+ 2nd axis
Y822	Y82A	Y832	Y83A	*+AIT3	Automatic interlock+ 3rd axis
Y823	Y82B	Y833	Y83B	*+AIT4	Automatic interlock+ 4th axis
Y824	Y82C	Y834	Y83C	*+AIT5	Automatic interlock+ 5th axis
Y825	Y82D	Y835	Y83D	*+AIT6	Automatic interlock+ 6th axis
Y826	Y82E	Y836	Y83E	*+AIT7	Automatic interlock+ 7th axis
Y827	Y82F	Y837	Y83F	*+AIT8	Automatic interlock+ 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y840	Y848	Y850	Y858	*-AIT1	Automatic interlock- 1st axis
Y841	Y849	Y851	Y859	*-AIT2	Automatic interlock- 2nd axis
Y842	Y84A	Y852	Y85A	*-AIT3	Automatic interlock- 3rd axis
Y843	Y84B	Y853	Y85B	*-AIT4	Automatic interlock- 4th axis
Y844	Y84C	Y854	Y85C	*-AIT5	Automatic interlock- 5th axis
Y845	Y84D	Y855	Y85D	*-AIT6	Automatic interlock- 6th axis
Y846	Y84E	Y856	Y85E	*-AIT7	Automatic interlock- 7th axis
Y847	Y84F	Y857	Y85F	*-AIT8	Automatic interlock- 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y860	Y868	Y870	Y878	*+MIT1	Manual interlock+ 1st axis
Y861	Y869	Y871	Y879	*+MIT2	Manual interlock+ 2nd axis
Y862	Y86A	Y872	Y87A	*+MIT3	Manual interlock+ 3rd axis
Y863	Y86B	Y873	Y87B	*+MIT4	Manual interlock+ 4th axis
Y864	Y86C	Y874	Y87C	*+MIT5	Manual interlock+ 5th axis
Y865	Y86D	Y875	Y87D	*+MIT6	Manual interlock+ 6th axis
Y866	Y86E	Y876	Y87E	*+MIT7	Manual interlock+ 7th axis
Y867	Y86F	Y877	Y87F	*+MIT8	Manual interlock+ 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y880	Y888	Y890	Y898	*-MIT1	Manual interlock- 1st axis
Y881	Y889	Y891	Y899	*-MIT2	Manual interlock- 2nd axis
Y882	Y88A	Y892	Y89A	*-MIT3	Manual interlock- 3rd axis
Y883	Y88B	Y893	Y89B	*-MIT4	Manual interlock- 4th axis
Y884	Y88C	Y894	Y89C	*-MIT5	Manual interlock- 5th axis
Y885	Y88D	Y895	Y89D	*-MIT6	Manual interlock- 6th axis
Y886	Y88E	Y896	Y89E	*-MIT7	Manual interlock- 7th axis
Y887	Y88F	Y897	Y89F	*-MIT8	Manual interlock- 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y8A0	Y8A8	Y8B0	Y8B8	AMLK1	Automatic machine lock 1st axis
Y8A1	Y8A9	Y8B1	Y8B9	AMLK2	Automatic machine lock 2nd axis
Y8A2	Y8AA	Y8B2	Y8BA	AMLK3	Automatic machine lock 3rd axis
Y8A3	Y8AB	Y8B3	Y8BB	AMLK4	Automatic machine lock 4th axis
Y8A4	Y8AC	Y8B4	Y8BC	AMLK5	Automatic machine lock 5th axis
Y8A5	Y8AD	Y8B5	Y8BD	AMLK6	Automatic machine lock 6th axis
Y8A6	Y8AE	Y8B6	Y8BE	AMLK7	Automatic machine lock 7th axis
Y8A7	Y8AF	Y8B7	Y8BF	AMLK8	Automatic machine lock 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y8C0	Y8C8	Y8D0	Y8D8	MMLK1	Manual machine lock 1st axis
Y8C1	Y8C9	Y8D1	Y8D9	MMLK2	Manual machine lock 2nd axis
Y8C2	Y8CA	Y8D2	Y8DA	MMLK3	Manual machine lock 3rd axis
Y8C3	Y8CB	Y8D3	Y8DB	MMLK4	Manual machine lock 4th axis
Y8C4	Y8CC	Y8D4	Y8DC	MMLK5	Manual machine lock 5th axis
Y8C5	Y8CD	Y8D5	Y8DD	MMLK6	Manual machine lock 6th axis
Y8C6	Y8CE	Y8D6	Y8DE	MMLK7	Manual machine lock 7th axis
Y8C7	Y8CF	Y8D7	Y8DF	MMLK8	Manual machine lock 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y8E0	Y8E8	Y8F0	Y8F8	+J1	Feed axis selection+ 1st axis
Y8E1	Y8E9	Y8F1	Y8F9	+J2	Feed axis selection+ 2nd axis
Y8E2	Y8EA	Y8F2	Y8FA	+J3	Feed axis selection+ 3rd axis
Y8E3	Y8EB	Y8F3	Y8FB	+J4	Feed axis selection+ 4th axis
Y8E4	Y8EC	Y8F4	Y8FC	+J5	Feed axis selection+ 5th axis
Y8E5	Y8ED	Y8F5	Y8FD	+J6	Feed axis selection+ 6th axis
Y8E6	Y8EE	Y8F6	Y8FE	+J7	Feed axis selection+ 7th axis
Y8E7	Y8EF	Y8F7	Y8FF	+J8	Feed axis selection+ 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y900	Y908	Y910	Y918	-J1	Feed axis selection- 1st axis
Y901	Y909	Y911	Y919	-J2	Feed axis selection- 2nd axis
Y902	Y90A	Y912	Y91A	-J3	Feed axis selection- 3rd axis
Y903	Y90B	Y913	Y91B	-J4	Feed axis selection- 4th axis
Y904	Y90C	Y914	Y91C	-J5	Feed axis selection- 5th axis
Y905	Y90D	Y915	Y91D	-J6	Feed axis selection- 6th axis
Y906	Y90E	Y916	Y91E	-J7	Feed axis selection- 7th axis
Y907	Y90F	Y917	Y91F	-J8	Feed axis selection- 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y920	Y928	Y930	Y938	MAE1	Manual/Automatic simultaneous valid 1st axis
Y921	Y929	Y931	Y939	MAE2	Manual/Automatic simultaneous valid 2nd axis
Y922	Y92A	Y932	Y93A	MAE3	Manual/Automatic simultaneous valid 3rd axis
Y923	Y92B	Y933	Y93B	MAE4	Manual/Automatic simultaneous valid 4th axis
Y924	Y92C	Y934	Y93C	MAE5	Manual/Automatic simultaneous valid 5th axis
Y925	Y92D	Y935	Y93D	MAE6	Manual/Automatic simultaneous valid 6th axis
Y926	Y92E	Y936	Y93E	MAE7	Manual/Automatic simultaneous valid 7th axis
Y927	Y92F	Y937	Y93F	MAE8	Manual/Automatic simultaneous valid 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y940	Y948	Y950	Y958	FBE1	Manual feedrate B valid 1st axis
Y941	Y949	Y951	Y959	FBE2	Manual feedrate B valid 2nd axis
Y942	Y94A	Y952	Y95A	FBE3	Manual feedrate B valid 3rd axis
Y943	Y94B	Y953	Y95B	FBE4	Manual feedrate B valid 4th axis
Y944	Y94C	Y954	Y95C	FBE5	Manual feedrate B valid 5th axis
Y945	Y94D	Y955	Y95D	FBE6	Manual feedrate B valid 6th axis
Y946	Y94E	Y956	Y95E	FBE7	Manual feedrate B valid 7th axis
Y947	Y94F	Y957	Y95F	FBE8	Manual feedrate B valid 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y960	Y968	Y970	Y978	AZS1	Zero point initialization set mode 1st axis
Y961	Y969	Y971	Y979	AZS2	Zero point initialization set mode 2nd axis
Y962	Y96A	Y972	Y97A	AZS3	Zero point initialization set mode 3rd axis
Y963	Y96B	Y973	Y97B	AZS4	Zero point initialization set mode 4th axis
Y964	Y96C	Y974	Y97C	AZS5	Zero point initialization set mode 5th axis
Y965	Y96D	Y975	Y97D	AZS6	Zero point initialization set mode 6th axis
Y966	Y96E	Y976	Y97E	AZS7	Zero point initialization set mode 7th axis
Y967	Y96F	Y977	Y97F	AZS8	Zero point initialization set mode 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y980	Y988	Y990	Y998	ZST1	Zero point initialization set start 1st axis
Y981	Y989	Y991	Y999	ZST2	Zero point initialization set start 2nd axis
Y982	Y98A	Y992	Y99A	ZST3	Zero point initialization set start 3rd axis
Y983	Y98B	Y993	Y99B	ZST4	Zero point initialization set start 4th axis
Y984	Y98C	Y994	Y99C	ZST5	Zero point initialization set start 5th axis
Y985	Y98D	Y995	Y99D	ZST6	Zero point initialization set start 6th axis
Y986	Y98E	Y996	Y99E	ZST7	Zero point initialization set start 7th axis
Y987	Y98F	Y997	Y99F	ZST8	Zero point initialization set start 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y9A0	Y9A8	Y9B0	Y9B8	ILC1	Current limit changeover 1st axis
Y9A1	Y9A9	Y9B1	Y9B9	ILC2	Current limit changeover 2nd axis
Y9A2	Y9AA	Y9B2	Y9BA	ILC3	Current limit changeover 3rd axis
Y9A3	Y9AB	Y9B3	Y9BB	ILC4	Current limit changeover 4th axis
Y9A4	Y9AC	Y9B4	Y9BC	ILC5	Current limit changeover 5th axis
Y9A5	Y9AD	Y9B5	Y9BD	ILC6	Current limit changeover 6th axis
Y9A6	Y9AE	Y9B6	Y9BE	ILC7	Current limit changeover 7th axis
Y9A7	Y9AF	Y9B7	Y9BF	ILC8	Current limit changeover 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y9C0	Y9C8	Y9D0	Y9D8	DOR1	Droop release request 1st axis
Y9C1	Y9C9	Y9D1	Y9D9	DOR2	Droop release request 2nd axis
Y9C2	Y9CA	Y9D2	Y9DA	DOR3	Droop release request 3rd axis
Y9C3	Y9CB	Y9D3	Y9DB	DOR4	Droop release request 4th axis
Y9C4	Y9CC	Y9D4	Y9DC	DOR5	Droop release request 5th axis
Y9C5	Y9CD	Y9D5	Y9DD	DOR6	Droop release request 6th axis
Y9C6	Y9CE	Y9D6	Y9DE	DOR7	Droop release request 7th axis
Y9C7	Y9CF	Y9D7	Y9DF	DOR8	Droop release request 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
Y9E0	Y9E8	Y9F0	Y9F8		Workpiece coordinate Measurement 1st axis (Spare)
Y9E1	Y9E9	Y9F1	Y9F9		Workpiece coordinate Measurement 2nd axis
Y9E2	Y9EA	Y9F2	Y9FA		Workpiece coordinate Measurement 3rd axis (Spare)
Y9E3	Y9EB	Y9F3	Y9FB		Workpiece coordinate Measurement 4th axis (Spare)
Y9E4	Y9EC	Y9F4	Y9FC		Workpiece coordinate Measurement 5th axis (Spare)
Y9E5	Y9ED	Y9F5	Y9FD		Workpiece coordinate Measurement 6th axis (Spare)
Y9E6	Y9EE	Y9F6	Y9FE		Workpiece coordinate Measurement 7th axis (Spare)
Y9E7	Y9EF	Y9F7	Y9FF		Workpiece coordinate Measurement 8th axis (Spare)

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YA00	YA08	YA10	YA18	DTCH21	Control axis detach 2 1st axis
YA01	YA09	YA11	YA19	DTCH22	Control axis detach 2 2nd axis
YA02	YA0A	YA12	YA1A	DTCH23	Control axis detach 2 3rd axis
YA03	YA0B	YA13	YA1B	DTCH24	Control axis detach 2 4th axis
YA04	YA0C	YA14	YA1C	DTCH25	Control axis detach 2 5th axis
YA05	YA0D	YA15	YA1D	DTCH26	Control axis detach 2 6th axis
YA06	YA0E	YA16	YA1E	DTCH27	Control axis detach 2 7th axis
YA07	YA0F	YA17	YA1F	DTCH28	Control axis detach 2 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YA20	YA28	YA30	YA38		Unclamp completion 1st axis
YA21	YA29	YA31	YA39		Unclamp completion 2nd axis
YA22	YA2A	YA32	YA3A		Unclamp completion 3rd axis
YA23	YA2B	YA33	YA3B		Unclamp completion 4th axis
YA24	YA2C	YA34	YA3C		Unclamp completion 5th axis
YA25	YA2D	YA35	YA3D		Unclamp completion 6th axis
YA26	YA2E	YA36	YA3E		Unclamp completion 7th axis
YA27	YA2F	YA37	YA3F		Unclamp completion 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YA40	YA48	YA50	YA58		Each axis reference position return 1st axis
YA41	YA49	YA51	YA59		Each axis reference position return 2nd axis
YA42	YA4A	YA52	YA5A		Each axis reference position return 3rd axis
YA43	YA4B	YA53	YA5B		Each axis reference position return 4th axis
YA44	YA4C	YA54	YA5C		Each axis reference position return 5th axis
YA45	YA4D	YA55	YA5D		Each axis reference position return 6th axis
YA46	YA4E	YA56	YA5E		Each axis reference position return 7th axis
YA47	YA4F	YA57	YA5F		Each axis reference position return 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YA60	YA68	YA70	YA78		Mixed control (cross axis control) request 1st axis
YA61	YA69	YA71	YA79		Mixed control (cross axis control) request 2nd axis
YA62	YA6A	YA72	YA7A		Mixed control (cross axis control) request 3rd axis
YA63	YA6B	YA73	YA7B		Mixed control (cross axis control) request 4th axis
YA64	YA6C	YA74	YA7C		Mixed control (cross axis control) request 5th axis
YA65	YA6D	YA75	YA7D		Mixed control (cross axis control) request 6th axis
YA66	YA6E	YA76	YA7E		Mixed control (cross axis control) request 7th axis
YA67	YA6F	YA77	YA7F		Mixed control (cross axis control) request 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YA80	YA88	YA90	YA98	SYNC1	Synchronous control request 1st axis
YA81	YA89	YA91	YA99	SYNC2	Synchronous control request 2nd axis
YA82	YA8A	YA92	YA9A	SYNC3	Synchronous control request 3rd axis
YA83	YA8B	YA93	YA9B	SYNC4	Synchronous control request 4th axis
YA84	YA8C	YA94	YA9C	SYNC5	Synchronous control request 5th axis
YA85	YA8D	YA95	YA9D	SYNC6	Synchronous control request 6th axis
YA86	YA8E	YA96	YA9E	SYNC7	Synchronous control request 7th axis
YA87	YA8F	YA97	YA9F	SYNC8	Synchronous control request 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YAA0	YAA8	YAB0	YAB8	PILE1	Superimposition control request 1st axis
YAA1	YAA9	YAB1	YAB9	PILE2	Superimposition control request 2nd axis
YAA2	YAAA	YAB2	YABA	PILE3	Superimposition control request 3rd axis
YAA3	YAAB	YAB3	YABB	PILE4	Superimposition control request 4th axis
YAA4	YAAC	YAB4	YABC	PILE5	Superimposition control request 5th axis
YAA5	YAAD	YAB5	YABD	PILE6	Superimposition control request 6th axis
YAA6	YAAE	YAB6	YABE	PILE7	Superimposition control request 7th axis
YAA7	YAAF	YAB7	YABF	PILE8	Superimposition control request 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YAC0	YAC8	YAD0	YAD8		NC axis control selection 1st axis
YAC1	YAC9	YAD1	YAD9		NC axis control selection 2nd axis
YAC2	YACA	YAD2	YADA		NC axis control selection 3rd axis
YAC3	YACB	YAD3	YADB		NC axis control selection 4th axis
YAC4	YACC	YAD4	YADC		NC axis control selection 5th axis
YAC5	YACD	YAD5	YADD		NC axis control selection 6th axis
YAC6	YACE	YAD6	YADE		NC axis control selection 7th axis
YAC7	YACF	YAD7	YADF		NC axis control selection 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YAE0	YAE8	YAF0	YAF8		Vertical axis pull-up prevention request 1st axis
YAE1	YAE9	YAF1	YAF9		Vertical axis pull-up prevention request 2nd axis
YAE2	YAEA	YAF2	YAFA		Vertical axis pull-up prevention request 3rd axis
YAE3	YAEB	YAF3	YAFB		Vertical axis pull-up prevention request 4th axis
YAE4	YAEC	YAF4	YAFC		Vertical axis pull-up prevention request 5th axis
YAE5	YAED	YAF5	YAFD		Vertical axis pull-up prevention request 6th axis
YAE6	YAEE	YAF6	YAFE		Vertical axis pull-up prevention request 7th axis
YAE7	YAEF	YAF7	YAFF		Vertical axis pull-up prevention request 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YB00	YB08	YB10	YB18		Clamp completion 1st axis ▲
YB01	YB09	YB11	YB19		Clamp completion 2nd axis ▲
YB02	YB0A	YB12	YB1A		Clamp completion 3rd axis ▲
YB03	YB0B	YB13	YB1B		Clamp completion 4th axis ▲
YB04	YB0C	YB14	YB1C		Clamp completion 5th axis ▲
YB05	YB0D	YB15	YB1D		Clamp completion 6th axis ▲
YB06	YB0E	YB16	YB1E		Clamp completion 7th axis ▲
YB07	YB0F	YB17	YB1F		Clamp completion 8th axis ▲

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YB20	YB28	YB30	YB38	HOBRTV1	Hob machining: retract amount selection 1st axis
YB21	YB29	YB31	YB39	HOBRTV2	Hob machining: retract amount selection 2nd axis
YB22	YB2A	YB32	YB3A	HOBRTV3	Hob machining: retract amount selection 3rd axis
YB23	YB2B	YB33	YB3B	HOBRTV4	Hob machining: retract amount selection 4th axis
YB24	YB2C	YB34	YB3C	HOBRTV5	Hob machining: retract amount selection 5th axis
YB25	YB2D	YB35	YB3D	HOBRTV6	Hob machining: retract amount selection 6th axis
YB26	YB2E	YB36	YB3E	HOBRTV7	Hob machining: retract amount selection 7th axis
YB27	YB2F	YB37	YB3F	HOBRTV8	Hob machining: retract amount selection 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YB40	YB48	YB50	YB58	ROTSPC1	Spindle-mode rotary axis control command 1st axis
YB41	YB49	YB51	YB59	ROTSPC2	Spindle-mode rotary axis control command 2nd axis
YB42	YB4A	YB52	YB5A	ROTSPC3	Spindle-mode rotary axis control command 3rd axis
YB43	YB4B	YB53	YB5B	ROTSPC4	Spindle-mode rotary axis control command 4th axis
YB44	YB4C	YB54	YB5C	ROTSPC5	Spindle-mode rotary axis control command 5th axis
YB45	YB4D	YB55	YB5D	ROTSPC6	Spindle-mode rotary axis control command 6th axis
YB46	YB4E	YB56	YB5E	ROTSPC7	Spindle-mode rotary axis control command 7th axis
YB47	YB4F	YB57	YB5F	ROTSPC8	Spindle-mode rotary axis control command 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YB60	YB68	YB70	YB78	SLMC1	Stored stroke limit Ⅰ:Change request 1st axis
YB61	YB69	YB71	YB79	SLMC2	Stored stroke limit Ⅰ:Change request 2nd axis
YB62	YB6A	YB72	YB7A	SLMC3	Stored stroke limit Ⅰ:Change request 3rd axis
YB63	YB6B	YB73	YB7B	SLMC4	Stored stroke limit Ⅰ:Change request 4th axis
YB64	YB6C	YB74	YB7C	SLMC5	Stored stroke limit Ⅰ:Change request 5th axis
YB65	YB6D	YB75	YB7D	SLMC6	Stored stroke limit Ⅰ:Change request 6th axis
YB66	YB6E	YB76	YB7E	SLMC7	Stored stroke limit Ⅰ:Change request 7th axis
YB67	YB6F	YB77	YB7F	SLMC8	Stored stroke limit Ⅰ:Change request 8th axis

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YB80	YB88	YB90	YB98	VGHLDC1	Real-time tuning 1: Speed control gain hold-down command 1st axis
YB81	YB89	YB91	YB99	VGHLDC2	Real-time tuning 1: Speed control gain hold-down command 2ndaxis
YB82	YB8A	YB92	YB9A	VGHLDC3	Real-time tuning 1: Speed control gain hold-down command 3rd axis
YB83	YB8B	YB93	YB9B	VGHLDC4	Real-time tuning 1: Speed control gain hold-down command 4th axis
YB84	YB8C	YB94	YB9C	VGHLDC5	Real-time tuning 1: Speed control gain hold-down command 5th axis
YB85	YB8D	YB95	YB9D	VGHLDC6	Real-time tuning 1: Speed control gain hold-down command 6th axis
YB86	YB8E	YB96	YB9E	VGHLDC7	Real-time tuning 1: Speed control gain hold-down command 7th axis
YB87	YB8F	YB97	YB9F	VGHLDC8	Real-time tuning 1: Speed control gain hold-down command 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YBA0	YBA8	YBB0	YBB8		
YBA1	YBA9	YBB1	YBB9		
YBA2	YBAA	YBB2	YBBA		
YBA3	YBAB	YBB3	YBBB		
YBA4	YBAC	YBB4	YBBC		
YBA5	YBAD	YBB5	YBBD		
YBA6	YBAE	YBB6	YBBE		
YBA7	YBAF	YBB7	YBBF		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YBC0	YBC8	YBD0	YBD8		
YBC1	YBC9	YBD1	YBD9		
YBC2	YBCA	YBD2	YBDA		
YBC3	YBCB	YBD3	YBDB		
YBC4	YBCC	YBD4	YBDC		
YBC5	YBCD	YBD5	YBDD		
YBC6	YBCE	YBD6	YBDE		
YBC7	YBCF	YBD7	YBDF		

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
YBE0	YBE8	YBF0	YBF8	GQEMG1	Machine group-based alarm stop: Machine group-based PLC interlock 1st axis
YBE1	YBE9	YBF1	YBF9	GQEMG2	Machine group-based alarm stop: Machine group-based PLC interlock 2nd axis
YBE2	YBEA	YBF2	YBFA	GQEMG3	Machine group-based alarm stop: Machine group-based PLC interlock 3rd axis
YBE3	YBEB	YBF3	YBFB	GQEMG4	Machine group-based alarm stop: Machine group-based PLC interlock 4th axis
YBE4	YBEC	YBF4	YBFC	GQEMG5	Machine group-based alarm stop: Machine group-based PLC interlock 5th axis
YBE5	YBED	YBF5	YBFD	GQEMG6	Machine group-based alarm stop: Machine group-based PLC interlock 6th axis
YBE6	YBEE	YBF6	YBFE	GQEMG7	Machine group-based alarm stop: Machine group-based PLC interlock 7th axis
YBE7	YBEF	YBF7	YBFF	GQEMG8	Machine group-based alarm stop: Machine group-based PLC interlock 8th axis

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC00	YD40	YE80	YFC0	Y1100	Y1240	Y1380	Y14C0	J	Jog mode
YC01	YD41	YE81	YFC1	Y1101	Y1241	Y1381	Y14C1	H	Handle mode
YC02	YD42	YE82	YFC2	Y1102	Y1242	Y1382	Y14C2	S	Incremental mode
YC03	YD43	YE83	YFC3	Y1103	Y1243	Y1383	Y14C3	PTP	Manual arbitrary feed mode
YC04	YD44	YE84	YFC4	Y1104	Y1244	Y1384	Y14C4	ZRN	Reference position return mode
YC05	YD45	YE85	YFC5	Y1105	Y1245	Y1385	Y14C5	AST	Automatic initialization mode
YC06	YD46	YE86	YFC6	Y1106	Y1246	Y1386	Y14C6		
YC07	YD47	YE87	YFC7	Y1107	Y1247	Y1387	Y14C7		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC08	YD48	YE88	YFC8	Y1108	Y1248	Y1388	Y14C8	MEM	Memory mode
YC09	YD49	YE89	YFC9	Y1109	Y1249	Y1389	Y14C9	T	Tape mode
YC0A	YD4A	YE8A	YFCA	Y110A	Y124A	Y138A	Y14CA		Online operation mode (Computer link B)
YC0B	YD4B	YE8B	YFCB	Y110B	Y124B	Y138B	Y14CB	D	MDI mode
YC0C	YD4C	YE8C	YFCC	Y110C	Y124C	Y138C	Y14CC		
YC0D	YD4D	YE8D	YFCD	Y110D	Y124D	Y138D	Y14CD		
YC0E	YD4E	YE8E	YFCE	Y110E	Y124E	Y138E	Y14CE	SBSM	Sub part system control: Sub part system control I mode
YC0F	YD4F	YE8F	YFCF	Y110F	Y124F	Y138F	Y14CF		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC10	YD50	YE90	YFD0	Y1110	Y1250	Y1390	Y14D0	ST	Automatic operation "start" command (Cycle start)
YC11	YD51	YE91	YFD1	Y1111	Y1251	Y1391	Y14D1	*SP	Automatic operation "pause" command (Feed hold)
YC12	YD52	YE92	YFD2	Y1112	YD1252	Y1392	Y14D2	SBK	Single block
YC13	YD53	YE93	YFD3	Y1113	Y1253	Y1393	Y14D3	*BSL	Block start interlock
YC14	YD54	YE94	YFD4	Y1114	Y1254	Y1394	Y14D4	*CSL	Cutting block start interlock
YC15	YD55	YE95	YFD5	Y1115	Y1255	Y1395	Y14D5	DRN	Dry run
YC16	YD56	YE96	YFD6	Y1116	Y1256	Y1396	Y14D6		
YC17	YD57	YE97	YFD7	Y1117	Y1257	Y1397	Y14D7	ERD	Error detection

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC18	YD58	YE98	YFD8	Y1118	Y1258	Y1398	Y14D8	NRST1	NC reset 1
YC19	YD59	YE99	YFD9	Y1119	Y1259	Y1399	Y14D9	NRST2	NC reset 2
YC1A	YD5A	YE9A	YFDA	Y111A	Y125A	Y139A	Y14DA	RRW	Reset & rewind
YC1B	YD5B	YE9B	YFDB	Y111B	Y125B	Y139B	Y14DB	*CDZ	Chamfering
YC1C	YD5C	YE9C	YFDC	Y111C	Y125C	Y139C	Y14DC	ARST	Automatic restart
YC1D	YD5D	YE9D	YFDD	Y111D	Y125D	Y139D	Y14DD		External search strobe
YC1E	YD5E	YE9E	YFDE	Y111E	Y125E	Y139E	Y14DE	FIN1	M function finish 1
YC1F	YD5F	YE9F	YFDF	Y111F	Y125F	Y139F	Y14DF	FIN2	M function finish 2

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YC20	YD60	YEA0	YFE0	Y1120	Y1260	Y13A0	Y14E0	TLM	Tool length measurement 1
YC21	YD61	YEA1	YFE1	Y1121	Y1261	Y13A1	Y14E1	TLMS	Tool length measurement 2
YC22	YD62	YEA2	YFE2	Y1122	Y1262	Y13A2	Y14E2		Synchronization correction mode
YC23	YD63	YEA3	YFE3	Y1123	Y1263	Y13A3	Y14E3	PRST	Program restart
YC24	YD64	YEA4	YFE4	Y1124	Y1264	Y13A4	Y14E4	PB	Playback
YC25	YD65	YEA5	YFE5	Y1125	Y1265	Y13A5	Y14E5	UIT	Macro interrupt
YC26	YD66	YEA6	YFE6	Y1126	Y1266	Y13A6	Y14E6	RT	Rapid traverse
YC27	YD67	YEA7	YFE7	Y1127	Y1267	Y13A7	Y14E7	VRV	Reverse run

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YC28	YD68	YEA8	YFE8	Y1128	Y1268	Y13A8	Y14E8	ABS	Manual absolute
YC29	YD69	YEA9	YFE9	Y1129	Y1269	Y13A9	Y14E9	DLK	Display lock
YC2A	YD6A	YEAA	YFEA	Y112A	Y126A	Y13AA	Y14EA	F1D	F1-digit speed change valid
YC2B	YD6B	YEAB	YFEB	Y112B	Y126B	Y13AB	Y14EB	CRQ	Recalculation request
YC2C	YD6C	YEAC	YFEC	Y112C	Y126C	Y13AC	Y14EC	QEMG	PLC emergency stop
YC2D	YD6D	YEAD	YFED	Y112D	Y126D	Y13AD	Y14ED	RTN	Reference position retract
YC2E	YD6E	YEAE	YFEE	Y112E	Y126E	Y13AE	Y14EE	PIT	PLC interrupt
YC2F	YD6F	YEAF	YFEF	Y112F	Y126F	Y13AF	Y14EF		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YC30	YD70	YEB0	YFF0	Y1130	Y1270	Y13B0	Y14F0	CHPS	Chopping
YC31	YD71	YEB1	YFF1	Y1131	Y1271	Y13B1	Y14F1	RSST	Search & start
YC32	YD72	YEB2	YFF2	Y1132	Y1272	Y13B2	Y14F2		
YC33	YD73	YEB3	YFF3	Y1133	Y1273	Y13B3	Y14F3		
YC34	YD74	YEB4	YFF4	Y1134	Y1274	Y13B4	Y14F4		Chopping parameter valid
YC35	YD75	YEB5	YFF5	Y1135	Y1275	Y13B5	Y14F5		Inclined axis control valid
YC36	YD76	YEB6	YFF6	Y1136	Y1276	Y13B6	Y14F6		Inclined axis control: No Z axis compensation
YC37	YD77	YEB7	YFF7	Y1137	Y1277	Y13B7	Y14F7	BDT1	Optional block skip 1

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YC38	YD78	YEB8	YFF8	Y1138	Y1278	Y13B8	Y14F8	BDT2	Optional block skip 2
YC39	YD79	YEB9	YFF9	Y1139	Y1279	Y13B9	Y14F9	BDT3	Optional block skip 3
YC3A	YD7A	YEBA	YFFA	Y113A	Y127A	Y13BA	Y14FA	BDT4	Optional block skip 4
YC3B	YD7B	YEBB	YFFB	Y113B	Y127B	Y13BB	Y14FB	BDT5	Optional block skip 5
YC3C	YD7C	YEBC	YFFC	Y113C	Y127C	Y13BC	Y14FC	BDT6	Optional block skip 6
YC3D	YD7D	YEBD	YFFD	Y113D	Y127D	Y13BD	Y14FD	BDT7	Optional block skip 7
YC3E	YD7E	YEBE	YFFE	Y113E	Y127E	Y13BE	Y14FE	BDT8	Optional block skip 8
YC3F	YD7F	YEBF	YFFF	Y113F	Y127F	Y13BF	Y14FF	BDT9	Optional block skip 9

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC40	YD80	YEC0	Y1000	Y1140	Y1280	Y13C0	Y1500	HS11	1st handle axis selection code 1
YC41	YD81	YEC1	Y1001	Y1141	Y1281	Y13C1	Y1501	HS12	1st handle axis selection code 2
YC42	YD82	YEC2	Y1002	Y1142	Y1282	Y13C2	Y1502	HS14	1st handle axis selection code 4
YC43	YD83	YEC3	Y1003	Y1143	Y1283	Y13C3	Y1503	HS18	1st handle axis selection code 8
YC44	YD84	YEC4	Y1004	Y1144	Y1284	Y13C4	Y1504	HS116	1st handle axis selection code 16
YC45	YD85	YEC5	Y1005	Y1145	Y1285	Y13C5	Y1505		
YC46	YD86	YEC6	Y1006	Y1146	Y1286	Y13C6	Y1506		
YC47	YD87	YEC7	Y1007	Y1147	Y1287	Y13C7	Y1507	HS1S	1st handle valid

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC48	YD88	YEC8	Y1008	Y1148	Y1288	Y13C8	Y1508	HS21	2nd handle axis selection code 1
YC49	YD89	YEC9	Y1009	Y1149	Y1289	Y13C9	Y1509	HS22	2nd handle axis selection code 2
YC4A	YD8A	YECA	Y100A	Y114A	Y128A	Y13CA	Y150A	HS24	2nd handle axis selection code 4
YC4B	YD8B	YECB	Y100B	Y114B	Y128B	Y13CB	Y150B	HS28	2nd handle axis selection code 8
YC4C	YD8C	YECC	Y100C	Y114C	Y128C	Y13CC	Y150C	HS216	2nd handle axis selection code 16
YC4D	YD8D	YECD	Y100D	Y114D	Y128D	Y13CD	Y150D		
YC4E	YD8E	YECE	Y100E	Y114E	Y128E	Y13CE	Y150E		
YC4F	YD8F	YECF	Y100F	Y114F	Y128F	Y13CF	Y150F	HS2S	2nd handle valid

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC50	YD90	YED0	Y1010	Y1150	Y1290	Y13D0	Y1510	HS31	3rd handle axis selection code 1
YC51	YD91	YED1	Y1011	Y1151	Y1291	Y13D1	Y1511	HS32	3rd handle axis selection code 2
YC52	YD92	YED2	Y1012	Y1152	Y1292	Y13D2	Y1512	HS34	3rd handle axis selection code 4
YC53	YD93	YED3	Y1013	Y1153	Y1293	Y13D3	Y1513	HS38	3rd handle axis selection code 8
YC54	YD94	YED4	Y1014	Y1154	Y1294	Y13D4	Y1514	HS316	3rd handle axis selection code 16
YC55	YD95	YED5	Y1015	Y1155	Y1295	Y13D5	Y1515		
YC56	YD96	YED6	Y1016	Y1156	Y1296	Y13D6	Y1516		
YC57	YD97	YED7	Y1017	Y1157	Y1297	Y13D7	Y1517	HS3S	3rd handle valid

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC58	YD98	YED8	Y1018	Y1158	Y1298	Y13D8	Y1518	OVC	Override cancel
YC59	YD99	YED9	Y1019	Y1159	Y1299	Y13D9	Y1519	OVSL	Manual override method selection
YC5A	YD9A	YEDA	Y101A	Y115A	Y129A	Y13DA	Y151A	AFL	Miscellaneous function lock
YC5B	YD9B	YEDB	Y101B	Y115B	Y129B	Y13DB	Y151B		
YC5C	YD9C	YEDC	Y101C	Y115C	Y129C	Y13DC	Y151C	TRV	Tap retract
YC5D	YD9D	YEDD	Y101D	Y115D	Y129D	Y13DD	Y151D		
YC5E	YD9E	YEDE	Y101E	Y115E	Y129E	Y13DE	Y151E		Tool handle feed mode
YC5F	YD9F	YEDF	Y101F	Y115F	Y129F	Y13DF	Y151F		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YC60	YDA0	YEE0	Y1020	Y1160	Y12A0	Y13E0	Y1520	*FV1	Cutting feedrate override code 1
YC61	YDA1	YEE1	Y1021	Y1161	Y12A1	Y13E1	Y1521	*FV2	Cutting feedrate override code 2
YC62	YDA2	YEE2	Y1022	Y1162	Y12A2	Y13E2	Y1522	*FV4	Cutting feedrate override code 4
YC63	YDA3	YEE3	Y1023	Y1163	Y12A3	Y13E3	Y1523	*FV8	Cutting feedrate override code 8
YC64	YDA4	YEE4	Y1024	Y1164	Y12A4	Y13E4	Y1524	*FV16	Cutting feedrate override code 16
YC65	YDA5	YEE5	Y1025	Y1165	Y12A5	Y13E5	Y1525		
YC66	YDA6	YEE6	Y1026	Y1166	Y12A6	Y13E6	Y1526	FV2E	2nd cutting feedrate override valid
YC67	YDA7	YEE7	Y1027	Y1167	Y12A7	Y13E7	Y1527	FVS	Cutting feedrate override method selection

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YC68	YDA8	YEE8	Y1028	Y1168	Y12A8	Y13E8	Y1528	ROV1	Rapid traverse override code 1
YC69	YDA9	YEE9	Y1029	Y1169	Y12A9	Y13E9	Y1529	ROV2	Rapid traverse override code 2
YC6A	YDAA	YEEA	Y102A	Y116A	Y12AA	Y13EA	Y152A		
YC6B	YDAB	YEEB	Y102B	Y116B	Y12AB	Y13EB	Y152B		
YC6C	YDAC	YEEC	Y102C	Y116C	Y12AC	Y13EC	Y152C		
YC6D	YDAD	YEED	Y102D	Y116D	Y12AD	Y13ED	Y152D		
YC6E	YDAE	YEEE	Y102E	Y116E	Y12AE	Y13EE	Y152E		
YC6F	YDAF	YEEF	Y102F	Y116F	Y12AF	Y13EF	Y152F	ROVS	Rapid traverse override method selection

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YC70	YDB0	YEF0	Y1030	Y1170	Y12B0	Y13F0	Y1530	*JV1	Manual feedrate code 1
YC71	YDB1	YEF1	Y1031	Y1171	Y12B1	Y13F1	Y1531	*JV2	Manual feedrate code 2
YC72	YDB2	YEF2	Y1032	Y1172	Y12B2	Y13F2	Y1532	*JV4	Manual feedrate code 4
YC73	YDB3	YEF3	Y1033	Y1173	Y12B3	Y13F3	Y1533	*JV8	Manual feedrate code 8
YC74	YDB4	YEF4	Y1034	Y1174	Y12B4	Y13F4	Y1534	*JV16	Manual feedrate code 16
YC75	YDB5	YEF5	Y1035	Y1175	Y12B5	Y13F5	Y1535		
YC76	YDB6	YEF6	Y1036	Y1176	Y12B6	Y13F6	Y1536	MCLMP	Manual speed clamp ON
YC77	YDB7	YEF7	Y1037	Y1177	Y12B7	Y13F7	Y1537	JVS	Manual feedrate method selection

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YC78	YDB8	YEF8	Y1038	Y1178	Y12B8	Y13F8	Y1538	PCF1	Feedrate least increment code 1
YC79	YDB9	YEF9	Y1039	Y1179	Y12B9	Y13F9	Y1539	PCF2	Feedrate least increment code 2
YC7A	YDBA	YEFA	Y103A	Y117A	Y12BA	Y13FA	Y153A		
YC7B	YDBB	YEFB	Y103B	Y117B	Y12BB	Y13FB	Y153B	JHAN	Jog handle synchronous
YC7C	YDBC	YEFC	Y103C	Y117C	Y12BC	Y13FC	Y153C		Each axis manual feedrate B valid
YC7D	YDBD	YEFD	Y103D	Y117D	Y12BD	Y13FD	Y153D		Manual feedrate B surface speed control valid
YC7E	YDBE	YEFE	Y103E	Y117E	Y12BE	Y13FE	Y153E		Circular feed in manual mode valid
YC7F	YDBF	YEFF	Y103F	Y117F	Y12BF	Y13FF	Y153F		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC80	YDC0	YF00	Y1040	Y1180	Y12C0	Y1400	Y1540	MP1	Handle/incremental feed magnification code 1
YC81	YDC1	YF01	Y1041	Y1181	Y12C1	Y1401	Y1541	MP2	Handle/incremental feed magnification code 2
YC82	YDC2	YF02	Y1042	Y1182	Y12C2	Y1402	Y1542	MP4	Handle/incremental feed magnification code 4
YC83	YDC3	YF03	Y1043	Y1183	Y12C3	Y1403	Y1543		
YC84	YDC4	YF04	Y1044	Y1184	Y12C4	Y1404	Y1544		
YC85	YDC5	YF05	Y1045	Y1185	Y12C5	Y1405	Y1545		
YC86	YDC6	YF06	Y1046	Y1186	Y12C6	Y1406	Y1546		Magnification valid for each handle
YC87	YDC7	YF07	Y1047	Y1187	Y12C7	Y1407	Y1547	MPS	Handle/incremental feed magnification method selection

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC88	YDC8	YF08	Y1048	Y1188	Y12C8	Y1408	Y1548	TAL1	Tool alarm 1/Tool-skip
YC89	YDC9	YF09	Y1049	Y1189	Y12C9	Y1409	Y1549	TAL2	Tool alarm 2
YC8A	YDCA	YF0A	Y104A	Y118A	Y12CA	Y140A	Y154A	TCEF	Usage data count valid
YC8B	YDCB	YF0B	Y104B	Y118B	Y12CB	Y140B	Y154B	TLF1	Tool life management input
YC8C	YDCC	YF0C	Y104C	Y118C	Y12CC	Y140C	Y154C	TRST	Tool change reset
YC8D	YDCD	YF0D	Y104D	Y118D	Y12CD	Y140D	Y154D		Tool escape and return Transit point designation
YC8E	YDCE	YF0E	Y104E	Y118E	Y12CE	Y140E	Y154E		Manual tool length measurement interlock temporarily canceled ▲
YC8F	YDCF	YF0F	Y104F	Y118F	Y12CF	Y140F	Y154F		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC90	YDD0	YF10	Y1050	Y1190	Y12D0	Y1410	Y1550	ZSL1	Reference position selection code 1
YC91	YDD1	YF11	Y1051	Y1191	Y12D1	Y1411	Y1551	ZSL2	Reference position selection code 2
YC92	YDD2	YF12	Y1052	Y1192	Y12D2	Y1412	Y1552		Tool length compensation along the tool axis Compensation amount change mode
YC93	YDD3	YF13	Y1053	Y1193	Y12D3	Y1413	Y1553	RTNST	Tool retract and return 2 : Tool return start ▲
YC94	YDD4	YF14	Y1054	Y1194	Y12D4	Y1414	Y1554		
YC95	YDD5	YF15	Y1055	Y1195	Y12D5	Y1415	Y1555		In balance cut timing synchronization invalid ▲
YC96	YDD6	YF16	Y1056	Y1196	Y12D6	Y1416	Y1556		
YC97	YDD7	YF17	Y1057	Y1197	Y12D7	Y1417	Y1557		Reference position selection method

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YC98	YDD8	YF18	Y1058	Y1198	Y12D8	Y1418	Y1558		Tool life management: Temporary cancel of tool life expiration
YC99	YDD9	YF19	Y1059	Y1199	Y12D9	Y1419	Y1559		Tool life management: Temporary cancel of tool group life expiration
YC9A	YDDA	YF1A	Y105A	Y119A	Y12DA	Y141A	Y155A		
YC9B	YDDB	YF1B	Y105B	Y119B	Y12DB	Y141B	Y155B		
YC9C	YDDC	YF1C	Y105C	Y119C	Y12DC	Y141C	Y155C		
YC9D	YDDD	YF1D	Y105D	Y119D	Y12DD	Y141D	Y155D		Manual speed command valid
YC9E	YDDE	YF1E	Y105E	Y119E	Y12DE	Y141E	Y155E		Manual speed command sign reversed
YC9F	YDDF	YF1F	Y105F	Y119F	Y12DF	Y141F	Y155F		Manual speed command reverse run valid

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCA0	YDE0	YF20	Y1060	Y11A0	Y12E0	Y1420	Y1560	CX11	Manual arbitrary feed 1st axis selection code 1
YCA1	YDE1	YF21	Y1061	Y11A1	Y12E1	Y1421	Y1561	CX12	Manual arbitrary feed 1st axis selection code 2
YCA2	YDE2	YF22	Y1062	Y11A2	Y12E2	Y1422	Y1562	CX14	Manual arbitrary feed 1st axis selection code 4
YCA3	YDE3	YF23	Y1063	Y11A3	Y12E3	Y1423	Y1563	CX18	Manual arbitrary feed 1st axis selection code 8
YCA4	YDE4	YF24	Y1064	Y11A4	Y12E4	Y1424	Y1564	CX116	Manual arbitrary feed 1st axis selection code 16
YCA5	YDE5	YF25	Y1065	Y11A5	Y12E5	Y1425	Y1565		
YCA6	YDE6	YF26	Y1066	Y11A6	Y12E6	Y1426	Y1566		
YCA7	YDE7	YF27	Y1067	Y11A7	Y12E7	Y1427	Y1567	CX1S	Manual arbitrary feed 1st axis valid
Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCA8	YDE8	YF28	Y1068	Y11A8	Y12E8	Y1428	Y1568	CX21	Manual arbitrary feed 2nd axis selection code 1
YCA9	YDE9	YF29	Y1069	Y11A9	Y12E9	Y1429	Y1569	CX22	Manual arbitrary feed 2nd axis selection code 2
YCAA	YDEA	YF2A	Y106A	Y11AA	Y12EA	Y142A	Y156A	CX24	Manual arbitrary feed 2nd axis selection code 4
YCAB	YDEB	YF2B	Y106B	Y11AB	Y12EB	Y142B	Y156B	CX28	Manual arbitrary feed 2nd axis selection code 8
YCAC	YDEC	YF2C	Y106C	Y11AC	Y12EC	Y142C	Y156C	CX216	Manual arbitrary feed 2nd axis selection code 16
YCAD	YDED	YF2D	Y106D	Y11AD	Y12ED	Y142D	Y156D		
YCAE	YDEE	YF2E	Y106E	Y11AE	Y12EE	Y142E	Y156E		
YCAF	YDEF	YF2F	Y106F	Y11AF	Y12EF	Y142F	Y156F	CX2S	Manual arbitrary feed 2nd axis valid
Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCB0	YDF0	YF30	Y1070	Y11B0	Y12F0	Y1430	Y1570	CX31	Manual arbitrary feed 3rd axis selection code 1
YCB1	YDF1	YF31	Y1071	Y11B1	Y12F1	Y1431	Y1571	CX32	Manual arbitrary feed 3rd axis selection code 2
YCB2	YDF2	YF32	Y1072	Y11B2	Y12F2	Y1432	Y1572	CX34	Manual arbitrary feed 3rd axis selection code 4
YCB3	YDF3	YF33	Y1073	Y11B3	Y12F3	Y1433	Y1573	CX38	Manual arbitrary feed 3rd axis selection code 8
YCB4	YDF4	YF34	Y1074	Y11B4	Y12F4	Y1434	Y1574	CX316	Manual arbitrary feed 3rd axis selection code 16
YCB5	YDF5	YF35	Y1075	Y11B5	Y12F5	Y1435	Y1575		
YCB6	YDF6	YF36	Y1076	Y11B6	Y12F6	Y1436	Y1576		
YCB7	YDF7	YF37	Y1077	Y11B7	Y12F7	Y1437	Y1577	CX3S	Manual arbitrary feed 3rd axis valid
Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCB8	YDF8	YF38	Y1078	Y11B8	Y12F8	Y1438	Y1578	CXS1	Manual arbitrary feed Smoothing off
YCB9	YDF9	YF39	Y1079	Y11B9	Y12F9	Y1439	Y1579	CXS2	Manual arbitrary feed Axis independent
YCBA	YDFA	YF3A	Y107A	Y11BA	Y12FA	Y143A	Y157A	CXS3	Manual arbitrary feed EX.F/MODAL.F
YCBB	YDFB	YF3B	Y107B	Y11BB	Y12FB	Y143B	Y157B	CXS4	Manual arbitrary feed G0/G1
YCBC	YDFC	YF3C	Y107C	Y11BC	Y12FC	Y143C	Y157C	CXS5	Manual arbitrary feed MC/WK
YCBD	YDFD	YF3D	Y107D	Y11BD	Y12FD	Y143D	Y157D	CXS6	Manual arbitrary feed ABS/INC
YCBE	YDFE	YF3E	Y107E	Y11BE	Y12FE	Y143E	Y157E	*CXS7	Manual arbitrary feed Stop
YCBF	YDFF	YF3F	Y107F	Y11BF	Y12FF	Y143F	Y157F	CXS8	Manual arbitrary feed Strobe

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCC0	YE00	YF40	Y1080	Y11C0	Y1300	Y1440	Y1580	ILM1	Current limit mode 1
YCC1	YE01	YF41	Y1081	Y11C1	Y1301	Y1441	Y1581	ILM2	Current limit mode 2
YCC2	YE02	YF42	Y1082	Y11C2	Y1302	Y1442	Y1582		
YCC3	YE03	YF43	Y1083	Y11C3	Y1303	Y1443	Y1583	LDWT	Load monitor I : Teaching/Monitor execution ▲
YCC4	YE04	YF44	Y1084	Y11C4	Y1304	Y1444	Y1584		Load monitor I : Teaching mode ▲
YCC5	YE05	YF45	Y1085	Y11C5	Y1305	Y1445	Y1585		Load monitor I : Monitor mode ▲
YCC6	YE06	YF46	Y1086	Y11C6	Y1306	Y1446	Y1586		Load monitor I : Alarm reset
YCC7	YE07	YF47	Y1087	Y11C7	Y1307	Y1447	Y1587		Load monitor I : Warning reset ▲

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCC8	YE08	YF48	Y1088	Y11C8	Y1308	Y1448	Y1588	*ZRIT	2nd reference position return interlock
YCC9	YE09	YF49	Y1089	Y11C9	Y1309	Y1449	Y1589		Load monitor I : Adaptive control execution ▲
YCCA	YE0A	YF4A	Y108A	Y11CA	Y130A	Y144A	Y158A		Small diameter deep hole drilling cycle
YCCB	YE0B	YF4B	Y108B	Y11CB	Y130B	Y144B	Y158B		Chuck barrier ON
YCCC	YE0C	YF4C	Y108C	Y11CC	Y130C	Y144C	Y158C		High-speed retract function valid ▲
YCCD	YE0D	YF4D	Y108D	Y11CD	Y130D	Y144D	Y158D		
YCCE	YE0E	YF4E	Y108E	Y11CE	Y130E	Y144E	Y158E		
YCCF	YE0F	YF4F	Y108F	Y11CF	Y130F	Y144F	Y158F		Tool retract start ▲

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCD0	YE10	YF50	Y1090	Y11D0	Y1310	Y1450	Y1590		Waiting ignore
YCD1	YE11	YF51	Y1091	Y11D1	Y1311	Y1451	Y1591		Spindle-spindle polygon cancel
YCD2	YE12	YF52	Y1092	Y11D2	Y1312	Y1452	Y1592		Synchronous tapping command polarity reversal
YCD3	YE13	YF53	Y1093	Y11D3	Y1313	Y1453	Y1593		Spindle OFF mode
YCD4	YE14	YF54	Y1094	Y11D4	Y1314	Y1454	Y1594		Longitudinal hole drilling axis selection
YCD5	YE15	YF55	Y1095	Y11D5	Y1315	Y1455	Y1595		Optimum acceleration/deceleration parameter switching request [axis] ▲
YCD6	YE16	YF56	Y1096	Y11D6	Y1316	Y1456	Y1596	TRVEC	Tap retract possible state cancel
YCD7	YE17	YF57	Y1097	Y11D7	Y1317	Y1457	Y1597	CHPRCR	Chopping compensation update prevention request

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCD8	YE18	YF58	Y1098	Y11D8	Y1318	Y1458	Y1598		Barrier valid (left)
YCD9	YE19	YF59	Y1099	Y11D9	Y1319	Y1459	Y1599		Barrier valid (right)
YCDA	YE1A	YF5A	Y109A	Y11DA	Y131A	Y145A	Y159A		Tool presetter sub-side valid ▲
YCDB	YE1B	YF5B	Y109B	Y11DB	Y131B	Y145B	Y159B		
YCDC	YE1C	YF5C	Y109C	Y11DC	Y131C	Y145C	Y159C		
YCDD	YE1D	YF5D	Y109D	Y11DD	Y131D	Y145D	Y159D		
YCDE	YE1E	YF5E	Y109E	Y11DE	Y131E	Y145E	Y159E	HOBRTR	Hob machining: retract request
YCDF	YE1F	YF5F	Y109F	Y11DF	Y131F	Y145F	Y159F	HOBARTC	Hob machining: alarm retract control

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCE0	YE20	YF60	Y10A0	Y11E0	Y1320	Y1460	Y15A0		
YCE1	YE21	YF61	Y10A1	Y11E1	Y1321	Y1461	Y15A1		Door open II
YCE2	YE22	YF62	Y10A2	Y11E2	Y1322	Y1462	Y15A2		Door open signal input (spindle speed monitor)
YCE3	YE23	YF63	Y10A3	Y11E3	Y1323	Y1463	Y15A3		Door interlock spindle speed clamp
YCE4	YE24	YF64	Y10A4	Y11E4	Y1324	Y1464	Y15A4		
YCE5	YE25	YF65	Y10A5	Y11E5	Y1325	Y1465	Y15A5		
YCE6	YE26	YF66	Y10A6	Y11E6	Y1326	Y1466	Y15A6		
YCE7	YE27	YF67	Y10A7	Y11E7	Y1327	Y1467	Y15A7		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCE8	YE28	YF68	Y10A8	Y11E8	Y1328	Y1468	Y15A8		Door open II (2 channels per 1 part system)
YCE9	YE29	YF69	Y10A9	Y11E9	Y1329	Y1469	Y15A9		
YCEA	YE2A	YF6A	Y10AA	Y11EA	Y132A	Y146A	Y15AA		
YCEB	YE2B	YF6B	Y10AB	Y11EB	Y132B	Y146B	Y15AB		
YCEC	YE2C	YF6C	Y10AC	Y11EC	Y132C	Y146C	Y15AC		
YCED	YE2D	YF6D	Y10AD	Y11ED	Y132D	Y146D	Y15AD		
YCEE	YE2E	YF6E	Y10AE	Y11EE	Y132E	Y146E	Y15AE		
YCEF	YE2F	YF6F	Y10AF	Y11EF	Y132F	Y146F	Y15AF		Load monitor I : Cutting torque estimation execution

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCF0	YE30	YF70	Y10B0	Y11F0	Y1330	Y1470	Y15B0		
YCF1	YE31	YF71	Y10B1	Y11F1	Y1331	Y1471	Y15B1	RBSSY	Manual arbitrary reverse run: Reverse run block stop designated part system
YCF2	YE32	YF72	Y10B2	Y11F2	Y1332	Y1472	Y15B2		
YCF3	YE33	YF73	Y10B3	Y11F3	Y1333	Y1473	Y15B3		
YCF4	YE34	YF74	Y10B4	Y11F4	Y1334	Y1474	Y15B4	BCHK	Barrier check invalid
YCF5	YE35	YF75	Y10B5	Y11F5	Y1335	Y1475	Y15B5		
YCF6	YE36	YF76	Y10B6	Y11F6	Y1336	Y1476	Y15B6		
YCF7	YE37	YF77	Y10B7	Y11F7	Y1337	Y1477	Y15B7		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YCF8	YE38	YF78	Y10B8	Y11F8	Y1338	Y1478	Y15B8	MSYNC	Synchronization between part systems OFF
YCF9	YE39	YF79	Y10B9	Y11F9	Y1339	Y1479	Y15B9		
YCFA	YE3A	YF7A	Y10BA	Y11FA	Y133A	Y147A	Y15BA	DRNC	Dry run invalid
YCFB	YE3B	YF7B	Y10BB	Y11FB	Y133B	Y147B	Y15BB	AUTED	Automatic error detection
YCFC	YE3C	YF7C	Y10BC	Y11FC	Y133C	Y147C	Y15BC	MRPSG	Manual arbitrary reverse run: MSTB reverse run prohibited
YCFD	YE3D	YF7D	Y10BD	Y11FD	Y133D	Y147D	Y15BD		G71 Shape judgement disable ▲
YCFE	YE3E	YF7E	Y10BE	Y11FE	Y133E	Y147E	Y15BE		Appropriate machining diagnosis in progress ▲
YCFF	YE3F	YF7F	Y10BF	Y11FF	Y133F	Y147F	Y15BF		Appropriate machining diagnosis error reset ▲

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YD00	YE40	YF80	Y10C0	Y1200	Y1340	Y1480	Y15C0		
YD01	YE41	YF81	Y10C1	Y1201	Y1341	Y1481	Y15C1		
YD02	YE42	YF82	Y10C2	Y1202	Y1342	Y1482	Y15C2		
YD03	YE43	YF83	Y10C3	Y1203	Y1343	Y1483	Y15C3		
YD04	YE44	YF84	Y10C4	Y1204	Y1344	Y1484	Y15C4		
YD05	YE45	YF85	Y10C5	Y1205	Y1345	Y1485	Y15C5		
YD06	YE46	YF86	Y10C6	Y1206	Y1346	Y1486	Y15C6		
YD07	YE47	YF87	Y10C7	Y1207	Y1347	Y1487	Y15C7		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YD08	YE48	YF88	Y10C8	Y1208	Y1348	Y1488	Y15C8	RVSP	Reverse run from block start
YD09	YE49	YF89	Y10C9	Y1209	Y1349	Y1489	Y15C9	RVIT	Macro interrupt priority
YD0A	YE4A	YF8A	Y10CA	Y120A	Y134A	Y148A	Y15CA	RVMD	Reverse run control mode
YD0B	YE4B	YF8B	Y10CB	Y120B	Y134B	Y148B	Y15CB	ACCG	Rapid traverse time constant: Switchover request
YD0C	YE4C	YF8C	Y10CC	Y120C	Y134C	Y148C	Y15CC		
YD0D	YE4D	YF8D	Y10CD	Y120D	Y134D	Y148D	Y15CD		
YD0E	YE4E	YF8E	Y10CE	Y120E	Y134E	Y148E	Y15CE		
YD0F	YE4F	YF8F	Y10CF	Y120F	Y134F	Y148F	Y15CF		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YD10	YE50	YF90	Y10D0	Y1210	Y1350	Y1490	Y15D0		
YD11	YE51	YF91	Y10D1	Y1211	Y1351	Y1491	Y15D1		
YD12	YE52	YF92	Y10D2	Y1212	Y1352	Y1492	Y15D2		
YD13	YE53	YF93	Y10D3	Y1213	Y1353	Y1493	Y15D3		
YD14	YE54	YF94	Y10D4	Y1214	Y1354	Y1494	Y15D4		3D coordinate conversion : Manual feed coordinates conversion ▲
YD15	YE55	YF95	Y10D5	Y1215	Y1355	Y1495	Y15D5		
YD16	YE56	YF96	Y10D6	Y1216	Y1356	Y1496	Y15D6		
YD17	YE57	YF97	Y10D7	Y1217	Y1357	Y1497	Y15D7		

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YD18	YE58	YF98	Y10D8	Y1218	Y1358	Y1498	Y15D8	MJCT	3D manual feed (JOG, INC) in tool axis coordinate system
YD19	YE59	YF99	Y10D9	Y1219	Y1359	Y1499	Y15D9	MJCB	3D manual feed (JOG, INC) in table coordinate system
YD1A	YE5A	YF9A	Y10DA	Y121A	Y135A	Y149A	Y15DA	MJCF	3D manual feed (JOG, INC) in feature coordinate system
YD1B	YE5B	YF9B	Y10DB	Y121B	Y135B	Y149B	Y15DB	MH1CT	3D manual feed(1st handle) in tool axis coordinate system
YD1C	YE5C	YF9C	Y10DC	Y121C	Y135C	Y149C	Y15DC	MH1CB	3D manual feed (1st handle) in table coordinate system
YD1D	YE5D	YF9D	Y10DD	Y121D	Y135D	Y149D	Y15DD	MH1CF	3D manual feed(1st handle) in feature coordinate system
YD1E	YE5E	YF9E	Y10DE	Y121E	Y135E	Y149E	Y15DE	MH2CT	3D manual feed (2nd handle) in tool axis coordinate system
YD1F	YE5F	YF9F	Y10DF	Y121F	Y135F	Y149F	Y15DF	MH2CB	3D manual feed (2nd handle) in table coordinate system

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YD20	YE60	YFA0	Y10E0	Y1220	Y1360	Y14A0	Y15E0	MH2CF	3D manual feed (2nd handle) in feature coordinate system
YD21	YE61	YFA1	Y10E1	Y1221	Y1361	Y14A1	Y15E1	MH3CT	3D manual feed (3rd handle) in tool axis coordinate system
YD22	YE62	YFA2	Y10E2	Y1222	Y1362	Y14A2	Y15E2	MH3CB	3D manual feed (3rd handle) in table coordinate system
YD23	YE63	YFA3	Y10E3	Y1223	Y1363	Y14A3	Y15E3	MH3CF	3D manual feed (3rd handle) in feature coordinate system
YD24	YE64	YFA4	Y10E4	Y1224	Y1364	Y14A4	Y15E4		
YD25	YE65	YFA5	Y10E5	Y1225	Y1365	Y14A5	Y15E5		
YD26	YE66	YFA6	Y10E6	Y1226	Y1366	Y14A6	Y15E6		
YD27	YE67	YFA7	Y10E7	Y1227	Y1367	Y14A7	Y15E7	TCPRC	Tool center point rotation

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YD28	YE68	YFA8	Y10E8	Y1228	Y1368	Y14A8	Y15E8	MFIN1	Miscellaneous Function Command High-speed Output : M function finish 1
YD29	YE69	YFA9	Y10E9	Y1229	Y1369	Y14A9	Y15E9	MFIN2	Miscellaneous Function Command High-speed Output : M function finish 2
YD2A	YE6A	YFAA	Y10EA	Y122A	Y136A	Y14AA	Y15EA	MFIN3	Miscellaneous Function Command High-speed Output : M function finish 3
YD2B	YE6B	YFAB	Y10EB	Y122B	Y136B	Y14AB	Y15EB	MFIN4	Miscellaneous Function Command High-speed Output : M function finish 4
YD2C	YE6C	YFAC	Y10EC	Y122C	Y136C	Y14AC	Y15EC	SFIN1	Miscellaneous Function Command High-speed Output : S function finish 1
YD2D	YE6D	YFAD	Y10ED	Y122D	Y136D	Y14AD	Y15ED	SFIN2	Miscellaneous Function Command High-speed Output : S function finish 2
YD2E	YE6E	YFAE	Y10EE	Y122E	Y136E	Y14AE	Y15EE	SFIN3	Miscellaneous Function Command High-speed Output : S function finish 3
YD2F	YE6F	YFAF	Y10EF	Y122F	Y136F	Y14AF	Y15EF	SFIN4	Miscellaneous Function Command High-speed Output : S function finish 4

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YD30	YE70	YFB0	Y10F0	Y1230	Y1370	Y14B0	Y15F0	TFIN1	Miscellaneous Function Command High-speed Output : T function finish 1
YD31	YE71	YFB1	Y10F1	Y1231	Y1371	Y14B1	Y15F1	TFIN2	Miscellaneous Function Command High-speed Output : T function finish 2
YD32	YE72	YFB2	Y10F2	Y1232	Y1372	Y14B2	Y15F2	TFIN3	Miscellaneous Function Command High-speed Output : T function finish 3
YD33	YE73	YFB3	Y10F3	Y1233	Y1373	Y14B3	Y15F3	TFIN4	Miscellaneous Function Command High-speed Output : T function finish 4
YD34	YE74	YFB4	Y10F4	Y1234	Y1374	Y14B4	Y15F4	BFIN1	Miscellaneous Function Command High-speed Output : 2nd M function finish 1
YD35	YE75	YFB5	Y10F5	Y1235	Y1375	Y14B5	Y15F5	BFIN2	Miscellaneous Function Command High-speed Output : 2nd M function finish 2
YD36	YE76	YFB6	Y10F6	Y1236	Y1376	Y14B6	Y15F6	BFIN3	Miscellaneous Function Command High-speed Output : 2nd M function finish 3
YD37	YE77	YFB7	Y10F7	Y1237	Y1377	Y14B7	Y15F7	BFIN4	Miscellaneous Function Command High-speed Output : 2nd M function finish 4

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
YD38	YE78	YFB8	Y10F8	Y1238	Y1378	Y14B8	Y15F8	SFIN5	Miscellaneous Function Command High-speed Output : S function finish 5
YD39	YE79	YFB9	Y10F9	Y1239	Y1379	Y14B9	Y15F9	SFIN6	Miscellaneous Function Command High-speed Output : S function finish 6
YD3A	YE7A	YFBA	Y10FA	Y123A	Y137A	Y14BA	Y15FA		
YD3B	YE7B	YFBB	Y10FB	Y123B	Y137B	Y14BB	Y15FB		
YD3C	YE7C	YFBC	Y10FC	Y123C	Y137C	Y14BC	Y15FC		
YD3D	YE7D	YFBD	Y10FD	Y123D	Y137D	Y14BD	Y15FD		
YD3E	YE7E	YFBE	Y10FE	Y123E	Y137E	Y14BE	Y15FE		
YD3F	YE7F	YFBF	Y10FF	Y123F	Y137F	Y14BF	Y15FF		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
Y1870			Y1878		Edit/search
Y1871			Y1879		
Y1872			Y187A		
Y1873			Y187B		
Y1874			Y187C		
Y1875			Y187D		
Y1876			Y187E		
Y1877			Y187F		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y1880	Y18E0	Y1940	Y19A0	Y1A00	Y1A60	Y1AC0	Y1B20		
Y1881	Y18E1	Y1941	Y19A1	Y1A01	Y1A61	Y1AC1	Y1B21		
Y1882	Y18E2	Y1942	Y19A2	Y1A02	Y1A62	Y1AC2	Y1B22		
Y1883	Y18E3	Y1943	Y19A3	Y1A03	Y1A63	Y1AC3	Y1B23		
Y1884	Y18E4	Y1944	Y19A4	Y1A04	Y1A64	Y1AC4	Y1B24		
Y1885	Y18E5	Y1945	Y19A5	Y1A05	Y1A65	Y1AC5	Y1B25	GFIN	Gear shift completion
Y1886	Y18E6	Y1946	Y19A6	Y1A06	Y1A66	Y1AC6	Y1B26		
Y1887	Y18E7	Y1947	Y19A7	Y1A07	Y1A67	Y1AC7	Y1B27		
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y1888	Y18E8	Y1948	Y19A8	Y1A08	Y1A68	Y1AC8	Y1B28	SP1	Spindle speed override code 1
Y1889	Y18E9	Y1949	Y19A9	Y1A09	Y1A69	Y1AC9	Y1B29	SP2	Spindle speed override code 2
Y188A	Y18EA	Y194A	Y19AA	Y1A0A	Y1A6A	Y1ACA	Y1B2A	SP4	Spindle speed override code 4
Y188B	Y18EB	Y194B	Y19AB	Y1A0B	Y1A6B	Y1ACB	Y1B2B		
Y188C	Y18EC	Y194C	Y19AC	Y1A0C	Y1A6C	Y1ACC	Y1B2C		
Y188D	Y18ED	Y194D	Y19AD	Y1A0D	Y1A6D	Y1ACD	Y1B2D		
Y188E	Y18EE	Y194E	Y19AE	Y1A0E	Y1A6E	Y1ACE	Y1B2E		
Y188F	Y18EF	Y194F	Y19AF	Y1A0F	Y1A6F	Y1ACF	Y1B2F	SPS	Spindle override method selection
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y1890	Y18F0	Y1950	Y19B0	Y1A10	Y1A70	Y1AD0	Y1B30	GI1	Spindle gear selection code 1
Y1891	Y18F1	Y1951	Y19B1	Y1A11	Y1A71	Y1AD1	Y1B31	GI2	Spindle gear selection code 2
Y1892	Y18F2	Y1952	Y19B2	Y1A12	Y1A72	Y1AD2	Y1B32		
Y1893	Y18F3	Y1953	Y19B3	Y1A13	Y1A73	Y1AD3	Y1B33	EXOBS	Spindle holding force up
Y1894	Y18F4	Y1954	Y19B4	Y1A14	Y1A74	Y1AD4	Y1B34	SSTP	Spindle stop
Y1895	Y18F5	Y1955	Y19B5	Y1A15	Y1A75	Y1AD5	Y1B35	SSFT	Spindle gear shift
Y1896	Y18F6	Y1956	Y19B6	Y1A16	Y1A76	Y1AD6	Y1B36	SORC	Spindle orientation
Y1897	Y18F7	Y1957	Y19B7	Y1A17	Y1A77	Y1AD7	Y1B37		Spindle command invalid
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y1898	Y18F8	Y1958	Y19B8	Y1A18	Y1A78	Y1AD8	Y1B38	SRN	Spindle forward run start
Y1899	Y18F9	Y1959	Y19B9	Y1A19	Y1A79	Y1AD9	Y1B39	SRI	Spindle reverse run start
Y189A	Y18FA	Y195A	Y19BA	Y1A1A	Y1A7A	Y1ADA	Y1B3A	TL1	Spindle torque limit 1
Y189B	Y18FB	Y195B	Y19BB	Y1A1B	Y1A7B	Y1ADB	Y1B3B	TL2	Spindle torque limit 2
Y189C	Y18FC	Y195C	Y19BC	Y1A1C	Y1A7C	Y1ADC	Y1B3C	WRN	Spindle forward run index
Y189D	Y18FD	Y195D	Y19BD	Y1A1D	Y1A7D	Y1ADD	Y1B3D	WRI	Spindle reverse run index
Y189E	Y18FE	Y195E	Y19BE	Y1A1E	Y1A7E	Y1ADE	Y1B3E	ORC	Spindle orientation command
Y189F	Y18FF	Y195F	Y19BF	Y1A1F	Y1A7F	Y1ADF	Y1B3F	LRSL	L coil selection

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y18A0	Y1900	Y1960	Y19C0	Y1A20	Y1A80	Y1AE0	Y1B40		
Y18A1	Y1901	Y1961	Y19C1	Y1A21	Y1A81	Y1AE1	Y1B41		
Y18A2	Y1902	Y1962	Y19C2	Y1A22	Y1A82	Y1AE2	Y1B42		Spindle position control (C axis)Cutting gain L
Y18A3	Y1903	Y1963	Y19C3	Y1A23	Y1A83	Y1AE3	Y1B43		Spindle position control (C axis)Cutting gain H
Y18A4	Y1904	Y1964	Y19C4	Y1A24	Y1A84	Y1AE4	Y1B44		
Y18A5	Y1905	Y1965	Y19C5	Y1A25	Y1A85	Y1AE5	Y1B45	CMOD	Spindle position control (Spindle/C axis control): C axis selection
Y18A6	Y1906	Y1966	Y19C6	Y1A26	Y1A86	Y1AE6	Y1B46	LRSM	M coil selection
Y18A7	Y1907	Y1967	Y19C7	Y1A27	Y1A87	Y1AE7	Y1B47		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y18A8	Y1908	Y1968	Y19C8	Y1A28	Y1A88	Y1AE8	Y1B48	SWS	Spindle selection
Y18A9	Y1909	Y1969	Y19C9	Y1A29	Y1A89	Y1AE9	Y1B49		
Y18AA	Y190A	Y196A	Y19CA	Y1A2A	Y1A8A	Y1AEA	Y1B4A	SPRR	Spindle rotation reversal
Y18AB	Y190B	Y196B	Y19CB	Y1A2B	Y1A8B	Y1AEB	Y1B4B	SPRS	Spindle rotation direction switch method selection
Y18AC	Y190C	Y196C	Y19CC	Y1A2C	Y1A8C	Y1AEC	Y1B4C		
Y18AD	Y190D	Y196D	Y19CD	Y1A2D	Y1A8D	Y1AED	Y1B4D		
Y18AE	Y190E	Y196E	Y19CE	Y1A2E	Y1A8E	Y1AEE	Y1B4E		
Y18AF	Y190F	Y196F	Y19CF	Y1A2F	Y1A8F	Y1AEF	Y1B4F	MPCSL	PLC coil changeover

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y18B0	Y1910	Y1970	Y19D0	Y1A30	Y1A90	Y1AF0	Y1B50	SPSY	Spindle synchronization
Y18B1	Y1911	Y1971	Y19D1	Y1A31	Y1A91	Y1AF1	Y1B51	SPPHS	Spindle phase synchronization
Y18B2	Y1912	Y1972	Y19D2	Y1A32	Y1A92	Y1AF2	Y1B52	SPSDR	Spindle synchronous rotation direction
Y18B3	Y1913	Y1973	Y19D3	Y1A33	Y1A93	Y1AF3	Y1B53	SSPHM	Phase shift calculation request
Y18B4	Y1914	Y1974	Y19D4	Y1A34	Y1A94	Y1AF4	Y1B54	SSPHF	Phase offset request
Y18B5	Y1915	Y1975	Y19D5	Y1A35	Y1A95	Y1AF5	Y1B55	SPDRPO	Error temporary cancel
Y18B6	Y1916	Y1976	Y19D6	Y1A36	Y1A96	Y1AF6	Y1B56		
Y18B7	Y1917	Y1977	Y19D7	Y1A37	Y1A97	Y1AF7	Y1B57		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y18B8	Y1918	Y1978	Y19D8	Y1A38	Y1A98	Y1AF8	Y1B58	SPSYC	Spindle synchronization/ superimposition cancel
Y18B9	Y1919	Y1979	Y19D9	Y1A39	Y1A99	Y1AF9	Y1B59	SPCMPC	Chuck close
Y18BA	Y191A	Y197A	Y19DA	Y1A3A	Y1A9A	Y1AFA	Y1B5A		
Y18BB	Y191B	Y197B	Y19DB	Y1A3B	Y1A9B	Y1AFB	Y1B5B		
Y18BC	Y191C	Y197C	Y19DC	Y1A3C	Y1A9C	Y1AFC	Y1B5C		
Y18BD	Y191D	Y197D	Y19DD	Y1A3D	Y1A9D	Y1AFD	Y1B5D		
Y18BE	Y191E	Y197E	Y19DE	Y1A3E	Y1A9E	Y1AFE	Y1B5E		
Y18BF	Y191F	Y197F	Y19DF	Y1A3F	Y1A9F	Y1AFF	Y1B5F	SPOFF	Exclude spindle

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y18C0	Y1920	Y1980	Y19E0	Y1A40	Y1AA0	Y1B00	Y1B60		
Y18C1	Y1921	Y1981	Y19E1	Y1A41	Y1AA1	Y1B01	Y1B61		
Y18C2	Y1922	Y1982	Y19E2	Y1A42	Y1AA2	Y1B02	Y1B62		
Y18C3	Y1923	Y1983	Y19E3	Y1A43	Y1AA3	Y1B03	Y1B63		
Y18C4	Y1924	Y1984	Y19E4	Y1A44	Y1AA4	Y1B04	Y1B64		
Y18C5	Y1925	Y1985	Y19E5	Y1A45	Y1AA5	Y1B05	Y1B65		
Y18C6	Y1926	Y1986	Y19E6	Y1A46	Y1AA6	Y1B06	Y1B66		
Y18C7	Y1927	Y1987	Y19E7	Y1A47	Y1AA7	Y1B07	Y1B67		
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y18C8	Y1928	Y1988	Y19E8	Y1A48	Y1AA8	Y1B08	Y1B68		Spindle oscillation command
Y18C9	Y1929	Y1989	Y19E9	Y1A49	Y1AA9	Y1B09	Y1B69	WGTSC	Spindle control : Coil changeover gate cutoff timer interruption ▲
Y18CA	Y192A	Y198A	Y19EA	Y1A4A	Y1AAA	Y1B0A	Y1B6A	VGHLDC	Real-time tuning 1: Speed control gain hold-down command
Y18CB	Y192B	Y198B	Y19EB	Y1A4B	Y1AAB	Y1B0B	Y1B6B		
Y18CC	Y192C	Y198C	Y19EC	Y1A4C	Y1AAC	Y1B0C	Y1B6C		
Y18CD	Y192D	Y198D	Y19ED	Y1A4D	Y1AAD	Y1B0D	Y1B6D		
Y18CE	Y192E	Y198E	Y19EE	Y1A4E	Y1AAE	Y1B0E	Y1B6E		
Y18CF	Y192F	Y198F	Y19EF	Y1A4F	Y1AAF	Y1B0F	Y1B6F		
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y18D0	Y1930	Y1990	Y19F0	Y1A50	Y1AB0	Y1B10	Y1B70		
Y18D1	Y1931	Y1991	Y19F1	Y1A51	Y1AB1	Y1B11	Y1B71		
Y18D2	Y1932	Y1992	Y19F2	Y1A52	Y1AB2	Y1B12	Y1B72		
Y18D3	Y1933	Y1993	Y19F3	Y1A53	Y1AB3	Y1B13	Y1B73		
Y18D4	Y1934	Y1994	Y19F4	Y1A54	Y1AB4	Y1B14	Y1B74		
Y18D5	Y1935	Y1995	Y19F5	Y1A55	Y1AB5	Y1B15	Y1B75		
Y18D6	Y1936	Y1996	Y19F6	Y1A56	Y1AB6	Y1B16	Y1B75		
Y18D7	Y1937	Y1997	Y19F7	Y1A57	Y1AB7	Y1B17	Y1B77		
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y18D8	Y1938	Y1998	Y19F8	Y1A58	Y1AB8	Y1B18	Y1B78		
Y18D9	Y1939	Y1999	Y19F9	Y1A59	Y1AB9	Y1B19	Y1B79		
Y18DA	Y193A	Y199A	Y19FA	Y1A5A	Y1ABA	Y1B1A	Y1B7A		
Y18DB	Y193B	Y199B	Y19FB	Y1A5B	Y1ABB	Y1B1B	Y1B7B		
Y18DC	Y193C	Y199C	Y19FC	Y1A5C	Y1ABC	Y1B1C	Y1B7C		
Y18DD	Y193D	Y199D	Y19FD	Y1A5D	Y1ABD	Y1B1D	Y1B7D		
Y18DE	Y193E	Y199E	Y19FE	Y1A5E	Y1ABE	Y1B1E	Y1B7E		
Y18DF	Y193F	Y199F	Y19FF	Y1A5F	Y1ABF	Y1B1F	Y1B7F		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y1D00	Y1D20	Y1D40	Y1D60	Y1D80	Y1DA0	Y1DC0	Y1DE0		Position switch 1 interlock
Y1D01	Y1D21	Y1D41	Y1D61	Y1D81	Y1DA1	Y1DC1	Y1DE1		Position switch 2 interlock
Y1D02	Y1D22	Y1D42	Y1D62	Y1D82	Y1DA2	Y1DC2	Y1DE2		Position switch 3 interlock
Y1D03	Y1D23	Y1D43	Y1D63	Y1D83	Y1DA3	Y1DC3	Y1DE3		Position switch 4 interlock
Y1D04	Y1D24	Y1D44	Y1D64	Y1D84	Y1DA4	Y1DC4	Y1DE4		Position switch 5 interlock
Y1D05	Y1D25	Y1D45	Y1D65	Y1D85	Y1DA5	Y1DC5	Y1DE5		Position switch 6 interlock
Y1D06	Y1D26	Y1D46	Y1D66	Y1D86	Y1DA6	Y1DC6	Y1DE6		Position switch 7 interlock
Y1D07	Y1D27	Y1D47	Y1D67	Y1D87	Y1DA7	Y1DC7	Y1DE7		Position switch 8 interlock
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y1D08	Y1D28	Y1D48	Y1D68	Y1D88	Y1DA8	Y1DC8	Y1DE8		Position switch 9 interlock
Y1D09	Y1D29	Y1D49	Y1D69	Y1D89	Y1DA9	Y1DC9	Y1DE9		Position switch 10 interlock
Y1D0A	Y1D2A	Y1D4A	Y1D6A	Y1D8A	Y1DAA	Y1DCA	Y1DEA		Position switch 11 interlock
Y1D0B	Y1D2B	Y1D4B	Y1D6B	Y1D8B	Y1DAB	Y1DCB	Y1DEB		Position switch 12 interlock
Y1D0C	Y1D2C	Y1D4C	Y1D6C	Y1D8C	Y1DAC	Y1DCC	Y1DEC		Position switch 13 interlock
Y1D0D	Y1D2D	Y1D4D	Y1D6D	Y1D8D	Y1DAD	Y1DCD	Y1DED		Position switch 14 interlock
Y1D0E	Y1D2E	Y1D4E	Y1D6E	Y1D8E	Y1DAE	Y1DCE	Y1DEE		Position switch 15 interlock
Y1D0F	Y1D2F	Y1D4F	Y1D6F	Y1D8F	Y1DAF	Y1DCF	Y1DEF		Position switch 16 interlock
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y1D10	Y1D30	Y1D50	Y1D70	Y1D90	Y1DB0	Y1DD0	Y1DF0		Position switch 17 interlock
Y1D11	Y1D31	Y1D51	Y1D71	Y1D91	Y1DB1	Y1DD1	Y1DF1		Position switch 18 interlock
Y1D12	Y1D32	Y1D52	Y1D72	Y1D92	Y1DB2	Y1DD2	Y1DF2		Position switch 19 interlock
Y1D13	Y1D33	Y1D53	Y1D73	Y1D93	Y1DB3	Y1DD3	Y1DF3		Position switch 20 interlock
Y1D14	Y1D34	Y1D54	Y1D74	Y1D94	Y1DB4	Y1DD4	Y1DF4		Position switch 21 interlock
Y1D15	Y1D35	Y1D55	Y1D75	Y1D95	Y1DB5	Y1DD5	Y1DF5		Position switch 22 interlock
Y1D16	Y1D36	Y1D56	Y1D76	Y1D96	Y1DB6	Y1DD6	Y1DF6		Position switch 23 interlock
Y1D17	Y1D37	Y1D57	Y1D77	Y1D97	Y1DB7	Y1DD7	Y1DF7		Position switch 24 interlock
Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y1D18	Y1D38	Y1D58	Y1D78	Y1D98	Y1DB8	Y1DD8	Y1DF8		
Y1D19	Y1D39	Y1D59	Y1D79	Y1D99	Y1DB9	Y1DD9	Y1DF9		
Y1D1A	Y1D3A	Y1D5A	Y1D7A	Y1D9A	Y1DBA	Y1DDA	Y1DFA		
Y1D1B	Y1D3B	Y1D5B	Y1D7B	Y1D9B	Y1DBB	Y1DDB	Y1DFB		
Y1D1C	Y1D3C	Y1D5C	Y1D7C	Y1D9C	Y1DBC	Y1DDC	Y1DFC		
Y1D1D	Y1D3D	Y1D5D	Y1D7D	Y1D9D	Y1DBD	Y1DDD	Y1DFD		
Y1D1E	Y1D3E	Y1D5E	Y1D7E	Y1D9E	Y1DBE	Y1DDE	Y1DFE		
Y1D1F	Y1D3F	Y1D5F	Y1D7F	Y1D9F	Y1DBF	Y1DDF	Y1DFF		

2.4 PLC Output Signals (Data type: R***)

(Note) Signal with " ▲ " is prepared for a specific machine tool builder.

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R200	AO1	Analog output 1	R208		
R201	AO2	Analog output 2	R209		
R202	AO3	Analog output 3	R210		Displayed screen No.
R203	AO4	Analog output 4	R211		
R204			R212		KEY OUT 1
R205			R213		
R206			R214		
R207			R215		Power OFF indication Y device No.
Device	**Abbrev.**	**Signal name**	**Device**	**Abbrev.**	**Signal name**
R216		Detailed screen No.	R224		User sequence program version code A
R217			R225		User sequence program version code B
R218			R226		User sequence program version code C
R219			R227		User sequence program version code D
R220			R228		
R221			R229		
R222			R230		
R223			R231		
Device	**Abbrev.**	**Signal name**	**Device**	**Abbrev.**	**Signal name**
R232		User sequence program version code 2 A	R240		APLC version A
R233		User sequence program version code 2 B	R241		APLC version B
R234		User sequence program version code 2 C	R242		APLC version C
R235		User sequence program version code 2 D	R243		APLC version D
R236		User sequence program version code 2 E	R244		
R237		User sequence program version code 2 F	R245		
R238		User sequence program version code 2 G	R246		
R239		User sequence program version code 2 H	R247		
Device	**Abbrev.**	**Signal name**	**Device**	**Abbrev.**	**Signal name**
R248		OT ignored (Axis 1 to 8 for part system 1,2)	R256		
R249		OT ignored (Axis 1 to 8 for part system 3,4)	R257		
R250			R258		
R251			R259		
R252			R260		
R253			R261		
R254			R262		
R255		PLC axis OT ignored	R263		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R264			R272		Near-point dog ignored (Axis 1 to 8 for part system 1,2)
R265			R273		Near-point dog ignored (Axis 1 to 8 for part system 3,4)
R266			R274		
R267			R275		
R268			R276		
R269			R277		
R270			R278		
R271			R279		PLC axis near-point dog ignored

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R280			R288		
R281			R289		
R282			R290		
R283			R291		
R284			R292		
R285			R293		
R286			R294		
R287			R295		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R296	SOMD	Speed monitor mode	R304	NDPC	Power consumption computation: Consumption of devices other than drive system(L)
R297		Handy terminal Data area top address	R305		Power consumption computation: Consumption of devices other than drive system(H)
R298		Handy terminal Data valid number of registers	R306	DFPCC	Power consumption computation: Drive system's fixed consumption correction(L)
R299		Handy terminal Cause of communication error	R307		Power consumption computation: Drive system's fixed consumption correction(H)
R300			R308		Operator message I/F 1
R301			R309		Operator message I/F 2
R302			R310		Operator message I/F 3
R303			R311		Operator message I/F 4

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R312			R320		
R313			R321		
R314			R322		
R315			R323		
R316			R324		
R317			R325		
R318			R326		
R319			R327		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R328			R336		Tool I/D R/W pot No. designation ▲
R329			R337		Large diameter tool information ▲
R330			R338		Tool weight (spindle tool) ▲
R331			R339		Tool weight (standby tool) ▲
R332			R340		Unset tool information ▲
R333			R341		
R334			R342		Specified shape interference Shape No. designation
R335			R343		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R344			R352		Remote program input No. (L) ▲
R345			R353		Remote program input No. (H) ▲
R346			R354		Machine manufacturer macro password No. (L)
R347		Skip retract valid	R355		Machine manufacturer macro password No. (H)
R348		Skip retract amount (L) [M]	R356		Direct screen selection A
R349		Skip retract amount (H) [M]	R357		Direct screen selection B
R350		Skip retract speed (L) [M]	R358		Direct screen selection C
R351		Skip retract speed (H) [M]	R359		Direct screen selection D

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R360			R368		
R361		User level-based data protection: Operation level	R369		
R362			R370		
R363			R371		
R364			R372		High-speed simple program check: Time measurement output (L)
R365		Measures against tool setter chattering Movement amount	R373		High-speed simple program check: Time measurement output (H)
R366			R374		
R367			R375		Manual arbitrary reverse run handle selection

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R376			R384		
R377		Load meter comment designation	R385		
R378		High-speed simple program check: Time reduction coefficient	R386		
R379		Manual arbitrary reverse run speed multiplier	R387		
R380			R388		
R381			R389		
R382			R390		G/B spindle synchronization: position error compensation scale, and the number of times of compensations
R383			R391		Optimum acceleration/deceleration parameter switching axis (spindle and bit selection) ▲

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R392			R400		Ball screw thermal displacement compensation Offset amount 1st axis [M]
R393			R401		Ball screw thermal displacement compensation Max. compensation amount 1st axis [M]
R394			R402		Ball screw thermal displacement compensation Part-system, axis No. 1st axis
R395			R403		Ball screw thermal displacement compensation Offset amount 2nd axis [M]
R396		User PLC info program format info	R404		Ball screw thermal displacement compensation Max. compensation amount 2nd axis [M]
R397			R405		Ball screw thermal displacement compensation Part-system, axis No. 2nd axis
R398			R406		Ball screw thermal displacement compensation Offset amount 3rd axis [M]
R399			R407		Ball screw thermal displacement compensation Max. compensation amount 3rd axis

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R408		Ball screw thermal displacement compensation Part-system, axis No. 3rd axis [M]	R416		
R409		Ball screw thermal displacement compensation Offset amount 4th axis [M]	R417		
R410		Ball screw thermal displacement compensation Max. compensation amount 3rd axis [M]	R418		
R411		Ball screw thermal displacement compensation Part-system, axis No. 4th axis	R419		
R412			R420		
R413			R421		
R414			R422		
R415			R423		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R424		PLC window Reading start R register 1	R432		PLC window Reading start R register 3
R425		PLC window Number of read windows 1	R433		PLC window Number of read windows 3
R426		PLC window Writing start R register 1	R434		PLC window Writing start R register 3
R427		PLC window Number of write windows 1	R435		PLC window Number of write windows 3
R428		PLC window Reading start R register 2	R436		
R429		PLC window Number of read windows 2	R437		
R430		PLC window Writing start R register 2	R438		
R431		PLC window Number of write windows 2	R439		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R440		PLC axis control information address 1st axis	R448		PLC axis control buffering mode information address
R441		PLC axis control information address 2nd axis	R449		PLC axis control: droop release invalid axis ▲
R442		PLC axis control information address 3rd axis	R450		
R443		PLC axis control information address 4th axis	R451		
R444		PLC axis control information address 5th axis	R452		
R445		PLC axis control information address 6th axis	R453		
R446			R454		
R447			R455		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R456		Encoder 1 arbitrary pulse 1	R464		G/B spindle synchronization: maximum value of the relative position error during the steady state
R457		Encoder 1 arbitrary pulse 2	R465		G/B spindle synchronization: position error compensation amount
R458		Encoder 2 arbitrary pulse 1	R466		G/B spindle synchronization: phase shift amount
R459		Encoder 2 arbitrary pulse 2	R467		
R460		G/B spindle synchronization: maximum range of the relative position error	R468		
R461		G/B spindle synchronization: maximum value of the relative position error	R469		
R462		G/B spindle synchronization: average value of the relative position error during the steady state	R470		Modbus block 1 transfer position ▲
R463		G/B spindle synchronization: maximum range of the relative position error during the steady state for	R471		Modbus block 1 number of transfer ▲

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R472		Modbus block 2 transfer position ▲	R480		
R473		Modbus block 2 number of transfers ▲	R481		
R474		Modbus block 3 transfer position ▲	R482		
R475		Modbus block 3 number of transfers ▲	R483		
R476		Modbus block 4 transfer position ▲	R484		
R477		Modbus block 4 number of transfers ▲	R485		
R478		Modbus transfer cycle ▲	R486		
R479		Modbus time-out period ▲	R487		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R488			R496		
R489			R497		
R490			R498		
R491			R499		
R492					
R493					
R494					
R495					

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2500	R2700	R2900	R3100	R3300	R3500	R3700	R3900		1st cutting feedrate override
R2501	R2701	R2901	R3101	R3301	R3501	R3701	R3901		2nd cutting feedrate override
R2502	R2702	R2902	R3102	R3302	R3502	R3702	R3902		Rapid traverse override
R2503	R2703	R2903	R3103	R3303	R3503	R3703	R3903	CHPOV	Chopping override
R2504	R2704	R2904	R3104	R3304	R3504	R3704	R3904		Manual feedrate (L) [M]
R2505	R2705	R2905	R3105	R3305	R3505	R3705	R3905		Manual feedrate (H) [M]
R2506	R2706	R2906	R3106	R3306	R3506	R3706	R3906		Manual feedrate B (L) [M]
R2507	R2707	R2907	R3107	R3307	R3507	R3707	R3907		Manual feedrate B (H) [M]

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2508	R2708	R2908	R3108	R3308	R3508	R3708	R3908		1st handle/incremental feed magnification (L)
R2509	R2709	R2909	R3109	R3309	R3509	R3709	R3909		1st handle/incremental feed magnification (H)
R2510	R2710	R2910	R3110	R3310	R3510	R3710	R3910		2nd handle feed magnification (L)
R2511	R2711	R2911	R3111	R3311	R3511	R3711	R3911		2nd handle feed magnification (H)
R2512	R2712	R2912	R3112	R3312	R3512	R3712	R3912		3rd handle feed magnification (L)
R2513	R2713	R2913	R3113	R3313	R3513	R3713	R3913		3rd handle feed magnification (H)
R2514	R2714	R2914	R3114	R3314	R3514	R3714	R3914		
R2515	R2715	R2915	R3115	R3315	R3515	R3715	R3915		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2516	R2716	R2916	R3116	R3316	R3516	R3716	R3916		
R2517	R2717	R2917	R3117	R3317	R3517	R3717	R3917		Machine status animated warning display type
R2518	R2718	R2918	R3118	R3318	R3518	R3718	R3918		PLC interrupt program number (L)
R2519	R2719	R2919	R3119	R3319	R3519	R3719	R3919		PLC interrupt program number (H)
R2520	R2720	R2920	R3120	R3320	R3520	R3720	R3920		Load meter display interface 1 (L)
R2521	R2721	R2921	R3121	R3321	R3521	R3721	R3921		Load meter display interface 1 (H)
R2522	R2722	R2922	R3122	R3322	R3522	R3722	R3922		Load meter display interface 2 (L)
R2523	R2723	R2923	R3123	R3323	R3523	R3723	R3923		Load meter display interface 2 (H)

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2524	R2724	R2924	R3124	R3324	R3524	R3724	R3924		Manual feedrate B override
R2525	R2725	R2925	R3125	R3325	R3525	R3725	R3925		External search device No.
R2526	R2726	R2926	R3126	R3326	R3526	R3726	R3926		External search program No. (L)
R2527	R2727	R2927	R3127	R3327	R3527	R3727	R3927		External search program No. (H)
R2528	R2728	R2928	R3128	R3328	R3528	R3728	R3928		External search sequence No. (L)
R2529	R2729	R2929	R3129	R3329	R3529	R3729	R3929		External search sequence No. (H)
R2530	R2730	R2930	R3130	R3330	R3530	R3730	R3930		External search block No. (L)
R2531	R2731	R2931	R3131	R3331	R3531	R3731	R3931		External search block No. (H)

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2532	R2732	R2932	R3132	R3332	R3532	R3732	R3932		
R2533	R2733	R2933	R3133	R3333	R3533	R3733	R3933		
R2534	R2734	R2934	R3134	R3334	R3534	R3734	R3934		
R2535	R2735	R2935	R3135	R3335	R3535	R3735	R3935		
R2536	R2736	R2936	R3136	R3336	R3536	R3736	R3936		
R2537	R2737	R2937	R3137	R3337	R3537	R3737	R3937		
R2538	R2738	R2938	R3138	R3338	R3538	R3738	R3938		
R2539	R2739	R2939	R3139	R3339	R3539	R3739	R3939		
Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2540	R2740	R2940	R3140	R3340	R3540	R3740	R3940		
R2541	R2741	R2941	R3141	R3341	R3541	R3741	R3941		
R2542	R2742	R2942	R3142	R3342	R3542	R3742	R3942		
R2543	R2743	R2943	R3143	R3343	R3543	R3743	R3943		
R2544	R2744	R2944	R3144	R3344	R3544	R3744	R3944		Manual arbitrary feed 1st axis travel amount (L) [M]
R2545	R2745	R2945	R3145	R3345	R3545	R3745	R3945		Manual arbitrary feed 1st axis travel amount (H) [M]
R2546	R2746	R2946	R3146	R3346	R3546	R3746	R3946		
R2547	R2747	R2947	R3147	R3347	R3547	R3747	R3947		
Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2548	R2748	R2948	R3148	R3348	R3548	R3748	R3948		Manual arbitrary feed 2nd axis travel amount (L) [M]
R2549	R2749	R2949	R3149	R3349	R3549	R3749	R3949		Manual arbitrary feed 2nd axis travel amount (H) [M]
R2550	R2750	R2950	R3150	R3350	R3550	R3750	R3950		
R2551	R2751	R2951	R3151	R3351	R3551	R3751	R3951		
R2552	R2752	R2952	R3152	R3352	R3552	R3752	R3952		Manual arbitrary feed 3rd axis travel amount (L) [M]
R2553	R2753	R2953	R3153	R3353	R3553	R3753	R3953		Manual arbitrary feed 3rd axis travel amount (H) [M]
R2554	R2754	R2954	R3154	R3354	R3554	R3754	R3954		
R2555	R2755	R2955	R3155	R3355	R3555	R3755	R3955		
Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2556	R2756	R2956	R3156	R3356	R3556	R3756	R3956		Alarm message I/F 1
R2557	R2757	R2957	R3157	R3357	R3557	R3757	R3957		Alarm message I/F 2
R2558	R2758	R2958	R3158	R3358	R3558	R3758	R3958		Alarm message I/F 3
R2559	R2759	R2959	R3159	R3359	R3559	R3759	R3959		Alarm message I/F 4
R2560	R2760	R2960	R3160	R3360	R3560	R3760	R3960		Operator message I/F
R2561	R2761	R2961	R3161	R3361	R3561	R3761	R3961		
R2562	R2762	R2962	R3162	R3362	R3562	R3762	R3962		Search & start program No. (L)
R2563	R2763	R2963	R3163	R3363	R3563	R3763	R3963		Search & start program No. (H)

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2564	R2764	R2964	R3164	R3364	R3564	R3764	R3964		Manual skip I/F 1 (Manual skip control) ▲
R2565	R2765	R2965	R3165	R3365	R3565	R3765	R3965		Manual skip I/F 2 (Manual skip axis stop/read request) ▲
R2566	R2766	R2966	R3166	R3366	R3566	R3766	R3966		Manual skip I/F 3 (Manual skip axis stop mode) ▲
R2567	R2767	R2967	R3167	R3367	R3567	R3767	R3967		Encoder selection
R2568	R2768	R2968	R3168	R3368	R3568	R3768	R3968		C axis selection
R2569	R2769	R2969	R3169	R3369	R3569	R3769	R3969		
R2570	R2770	R2970	R3170	R3370	R3570	R3770	R3970		
R2571	R2771	R2971	R3171	R3371	R3571	R3771	R3971		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2572	R2772	R2972	R3172	R3372	R3572	R3772	R3972		
R2573	R2773	R2973	R3173	R3373	R3573	R3773	R3973		
R2574	R2774	R2974	R3174	R3374	R3574	R3774	R3974		
R2575	R2775	R2975	R3175	R3375	R3575	R3775	R3975		
R2576	R2776	R2976	R3176	R3376	R3576	R3776	R3976		
R2577	R2777	R2977	R3177	R3377	R3577	R3777	R3977		
R2578	R2778	R2978	R3178	R3378	R3578	R3778	R3978		
R2579	R2779	R2979	R3179	R3379	R3579	R3779	R3979		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2580	R2780	R2980	R3180	R3380	R3580	R3780	R3980		Load monitor I : Axis selection
R2581	R2781	R2981	R3181	R3381	R3581	R3781	R3981		Load monitor I : Load change rate detection axis ▲
R2582	R2782	R2982	R3182	R3382	R3582	R3782	R3982		Load monitor I : Teaching data sub-No. ▲
R2583	R2783	R2983	R3183	R3383	R3583	R3783	R3983		Load monitor I : Adaptive control basic axis selection ▲
R2584	R2784	R2984	R3184	R3384	R3584	R3784	R3984		Each axis reference position selection
R2585	R2785	R2985	R3185	R3385	R3585	R3785	R3985		
R2586	R2786	R2986	R3186	R3386	R3586	R3786	R3986		
R2587	R2787	R2987	R3187	R3387	R3587	R3787	R3987		Chopping control data address

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2588	R2788	R2988	R3188	R3388	R3588	R3788	R3988		Tool life management data sort
R2589	R2789	R2989	R3189	R3389	R3589	R3789	R3989		Synchronous control operation method
R2590	R2790	R2990	R3190	R3390	R3590	R3790	R3990		Tool group No. designation (L)
R2591	R2791	R2991	R3191	R3391	R3591	R3791	R3991		Tool group No. designation (H)
R2592	R2792	R2992	R3192	R3392	R3592	R3792	R3992		Reference position adjustment completion
R2593	R2793	R2993	R3193	R3393	R3593	R3793	R3993		Current limit changeover
R2594	R2794	R2994	R3194	R3394	R3594	R3794	R3994		Wear compensation No. (tool presetter)
R2595	R2795	R2995	R3195	R3395	R3595	R3795	R3995		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2596	R2796	R2996	R3196	R3396	R3596	R3796	R3996		Turret interference object tool No. designation
R2597	R2797	R2997	R3197	R3397	R3597	R3797	R3997		
R2598	R2798	R2998	R3198	R3398	R3598	R3798	R3998		
R2599	R2799	R2999	R3199	R3399	R3599	R3799	R3999		Workpiece coordinate selection ▲
R2600	R2800	R3000	R3200	R3400	R3600	R3800	R4000		Workpiece coordinate offset Measurement tool compensation No./Selected compensation tool No.(main) (L) (Note 1)
R2601	R2801	R3001	R3201	R3401	R3601	R3801	R4001		Workpiece coordinate offset Measurement tool compen. No./Selected compen. tool No.(main) (H)
R2602	R2802	R3002	R3202	R3402	R3602	R3802	R4002		Workpiece coordinate offset Measurement tool No./ Selected tool No.(main) (L) (Note 1)
R2603	R2803	R3003	R3203	R3403	R3603	R3803	R4003		Workpiece coordinate offset Measurement tool No./ Selected tool No.(main) (H)

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2604	R2804	R3004	R3204	R3404	R3604	R3804	R4004		Selected tool compensation No.(sub) (L)
R2605	R2805	R3005	R3205	R3405	R3605	R3805	R4005		Selected tool compensation No.(sub) (H)
R2606	R2806	R3006	R3206	R3406	R3606	R3806	R4006		Selected tool wear No. (sub) (L)
R2607	R2807	R3007	R3207	R3407	R3607	R3807	R4007		Selected tool wear No. (sub) (H)
R2608	R2808	R3008	R3208	R3408	R3608	R3808	R4008		Tool mounting information 1-16
R2609	R2809	R3009	R3209	R3409	R3609	R3809	R4009		Tool mounting information 17-32
R2610	R2810	R3010	R3210	R3410	R3610	R3810	R4010		Tool mounting information 33-48
R2611	R2811	R3011	R3211	R3411	R3611	R3811	R4011		Tool mounting information 49-64

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2612	R2812	R3012	R3212	R3412	R3612	R3812	R4012		Tool mounting information (65 - 80)
R2613	R2813	R3013	R3213	R3413	R3613	R3813	R4013		
R2614	R2814	R3014	R3214	R3414	R3614	R3814	R4014	SLSPNO	Multiple-spindle control I: Selected spindle No.
R2615	R2815	R3015	R3215	R3415	R3615	R3815	R4015		
R2616	R2816	R3016	R3216	R3416	R3616	R3816	R4016		Ext. machine coordinate: compensation No. ▲
R2617	R2817	R3017	R3217	R3417	R3617	R3817	R4017		Optimum acceleration/deceleration parameter switching axis (axis and bit selection) ▲
R2618	R2818	R3018	R3218	R3418	R3618	R3818	R4018		Tool length measurement 2 Tool No. (L)
R2619	R2819	R3019	R3219	R3419	R3619	R3819	R4019		Tool length measurement 2 Tool No. (H)

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2620	R2820	R3020	R3220	R3420	R3620	R3820	R4020		Constant torque control: Constant torque/proportional torque stopper control request axis
R2621	R2821	R3021	R3221	R3421	R3621	R3821	R4021		Constant torque control: Constant torque droop cancel request axis
R2622	R2822	R3022	R3222	R3422	R3622	R3822	R4022		
R2623	R2823	R3023	R3223	R3423	R3623	R3823	R4023		
R2624	R2824	R3024	R3224	R3424	R3624	R3824	R4024		
R2625	R2825	R3025	R3225	R3425	R3625	R3825	R4025		Servo ready completion output designation
R2626	R2826	R3026	R3226	R3426	R3626	R3826	R4026		Thread recutting command
R2627	R2827	R3027	R3227	R3427	R3627	R3827	R4027		Thread recutting execution operation

(Note 1) When the chuck barrier is checked, "Selected tool compensation No.(main):R2600, R2601" and "Selected tool No.(main):R2602, R2603" are applied.

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2628	R2828	R3028	R3228	R3428	R3628	R3828	R4028		Mechanical axis specifications 1st rotary axis angle (L)
R2629	R2829	R3029	R3229	R3429	R3629	R3829	R4029		Mechanical axis specifications 1st rotary axis angle (H)
R2630	R2830	R3030	R3230	R3430	R3630	R3830	R4030		Mechanical axis specifications 2nd rotary axis angle (L)
R2631	R2831	R3031	R3231	R3431	R3631	R3831	R4031		Mechanical axis specifications 2nd rotary axis angle (H)
R2632	R2832	R3032	R3232	R3432	R3632	R3832	R4032		
R2633	R2833	R3033	R3233	R3433	R3633	R3833	R4033		
R2634	R2834	R3034	R3234	R3434	R3634	R3834	R4034		
R2635	R2835	R3035	R3235	R3435	R3635	R3835	R4035		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2636	R2836	R3036	R3236	R3436	R3636	R3836	R4036		Circular feed in manual mode Operation mode data (L)
R2637	R2837	R3037	R3237	R3437	R3637	R3837	R4037		Circular feed in manual mode Operation mode data (H)
R2638	R2838	R3038	R3238	R3438	R3638	R3838	R4038		Circular feed in manual mode Part system designation
R2639	R2839	R3039	R3239	R3439	R3639	R3839	R4039		
R2640	R2840	R3040	R3240	R3440	R3640	R3840	R4040		Circular feed in manual mode Horizontal axis designation
R2641	R2841	R3041	R3241	R3441	R3641	R3841	R4041		Circular feed in manual mode Vertical axis designation
R2642	R2842	R3042	R3242	R3442	R3642	R3842	R4042		
R2643	R2843	R3043	R3243	R3443	R3643	R3843	R4043		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2644	R2844	R3044	R3244	R3444	R3644	R3844	R4044		Circular feed in manual mode Basic point X data (L)
R2645	R2845	R3045	R3245	R3445	R3645	R3845	R4045		Circular feed in manual mode Basic point X data (H)
R2646	R2846	R3046	R3246	R3446	R3646	R3846	R4046		
R2647	R2847	R3047	R3247	R3447	R3647	R3847	R4047		
R2648	R2848	R3048	R3248	R3448	R3648	R3848	R4048		Circular feed in manual mode Basic point Y data (L)
R2649	R2849	R3049	R3249	R3449	R3649	R3849	R4049		Circular feed in manual mode Basic point Y data (H)
R2650	R2850	R3050	R3250	R3450	R3650	R3850	R4050		
R2651	R2851	R3051	R3251	R3451	R3651	R3851	R4051		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2652	R2852	R3052	R3252	R3452	R3652	R3852	R4052		Circular feed in manual mode Travel range X+ data (L)
R2653	R2853	R3053	R3253	R3453	R3653	R3853	R4053		Circular feed in manual mode Travel range X+ data (H)
R2654	R2854	R3054	R3254	R3454	R3654	R3854	R4054		
R2655	R2855	R3055	R3255	R3455	R3655	R3855	R4055		
R2656	R2856	R3056	R3256	R3456	R3656	R3856	R4056		Circular feed in manual mode Travel range X- data (L)
R2657	R2857	R3057	R3257	R3457	R3657	R3857	R4057		Circular feed in manual mode Travel range X- data (H)
R2658	R2858	R3058	R3258	R3458	R3658	R3858	R4058		
R2659	R2859	R3059	R3259	R3459	R3659	R3859	R4059		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2660	R2860	R3060	R3260	R3460	R3660	R3860	R4060		Circular feed in manual mode Travel range Y+ data (L)
R2661	R2861	R3061	R3261	R3461	R3661	R3861	R4061		Circular feed in manual mode Travel range Y+ data (H)
R2662	R2862	R3062	R3262	R3462	R3662	R3862	R4062		
R2663	R2863	R3063	R3263	R3463	R3663	R3863	R4063		
R2664	R2864	R3064	R3264	R3464	R3664	R3864	R4064		Circular feed in manual mode Travel range Y- data (L)
R2665	R2865	R3065	R3265	R3465	R3665	R3865	R4065		Circular feed in manual mode Travel range Y- data (H)
R2666	R2866	R3066	R3266	R3466	R3666	R3866	R4066		
R2667	R2867	R3067	R3267	R3467	R3667	R3867	R4067		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2668	R2868	R3068	R3268	R3468	R3668	R3868	R4068		Circular feed in manual mode Gradient/arc center X data (L)
R2669	R2869	R3069	R3269	R3469	R3669	R3869	R4069		Circular feed in manual mode Gradient/arc center X data (H)
R2670	R2870	R3070	R3270	R3470	R3670	R3870	R4070		
R2671	R2871	R3071	R3271	R3471	R3671	R3871	R4071		
R2672	R2872	R3072	R3272	R3472	R3672	R3872	R4072		Circular feed in manual mode Gradient/arc center Y data (L)
R2673	R2873	R3073	R3273	R3473	R3673	R3873	R4073		Circular feed in manual mode Gradient/arc center Y data (H)
R2674	R2874	R3074	R3274	R3474	R3674	R3874	R4074		
R2675	R2875	R3075	R3275	R3475	R3675	R3875	R4075		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R2684	R2884	R3084	R3284	R3484	R3684	R3884	R4084		For specific users NC control signal 1 ▲
R2685	R2885	R3085	R3285	R3485	R3685	R3885	R4085		
R2686	R2886	R3086	R3286	R3486	R3686	R3886	R4086		
R2687	R2887	R3087	R3287	R3487	R3687	R3887	R4087		
R2688	R2888	R3088	R3288	R3488	R3688	R3888	R4088		Specific users Manual skip motion direction (-) ▲
R2689	R2889	R3089	R3289	R3489	R3689	R3889	R4089		Specific users Manual skip motion direction (+) ▲
R2690	R2890	R3090	R3290	R3490	R3690	R3890	R4090		
R2691	R2891	R3091	R3291	R3491	R3691	R3891	R4091		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R4400		3D Machine Interference Check : Enabled shape group No.1			
R4401		3D Machine Interference Check : Enabled shape group No.2			
R4402		3D Machine Interference Check : Enabled shape group No.3			
R4403		3D Machine Interference Check : Enabled shape group No.4			
R4404					
R4405					
R4406					
R4407					

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5700	R5716	R5732	R5748		Ext. machine coordinate system offset data 1st axis (L) [M]
R5701	R5717	R5733	R5749		Ext. machine coordinate system offset data 1st axis (H) [M]
R5702	R5718	R5734	R5750		Ext. machine coordinate system offset data 2nd axis (L) [M]
R5703	R5719	R5735	R5751		Ext. machine coordinate system offset data 2nd axis (H) [M]
R5704	R5720	R5736	R5752		Ext. machine coordinate system offset data 3rd axis (L) [M]
R5705	R5721	R5737	R5753		Ext. machine coordinate system offset data 3rd axis (H) [M]
R5706	R5722	R5738	R5754		Ext. machine coordinate system offset data 4th axis (L) [M]
R5707	R5723	R5739	R5755		Ext. machine coordinate system offset data 4th axis (H) [M]

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5708	R5724	R5740	R5756		Ext. machine coordinate system offset data 5th axis (L) [M]
R5709	R5725	R5741	R5757		Ext. machine coordinate system offset data 5th axis (H) [M]
R5710	R5726	R5742	R5758		Ext. machine coordinate system offset data 6th axis (L) [M]
R5711	R5727	R5743	R5759		Ext. machine coordinate system offset data 6th axis (H) [M]
R5712	R5728	R5744	R5760		Ext. machine coordinate system offset data 7th axis (L) [M]
R5713	R5729	R5745	R5761		Ext. machine coordinate system offset data 7th axis (H) [M]
R5714	R5730	R5746	R5762		Ext. machine coordinate system offset data 8th axis (L) [M]
R5715	R5731	R5747	R5763		Ext. machine coordinate system offset data 8th axis (H) [M]

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5764	R5780	R5796	R5812		Each axis manual feedrate B 1st axis (L) [M]
R5765	R5781	R5797	R5813		Each axis manual feedrate B 1st axis (H) [M]
R5766	R5782	R5798	R5814		Each axis manual feedrate B 2nd axis (L) [M]
R5767	R5783	R5799	R5815		Each axis manual feedrate B 2nd axis (H) [M]
R5768	R5784	R5800	R5816		Each axis manual feedrate B 3rd axis (L) [M]
R5769	R5785	R5801	R5817		Each axis manual feedrate B 3rd axis (H) [M]
R5770	R5786	R5802	R5818		Each axis manual feedrate B 4th axis (L) [M]
R5771	R5787	R5803	R5819		Each axis manual feedrate B 4th axis (H) [M]

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5772	R5788	R5804	R5820		Each axis manual feedrate B 5th axis (L) [M]
R5773	R5789	R5805	R5821		Each axis manual feedrate B 5th axis (H) [M]
R5774	R5790	R5806	R5822		Each axis manual feedrate B 6th axis (L) [M]
R5775	R5791	R5807	R5823		Each axis manual feedrate B 6th axis (H) [M]
R5776	R5792	R5808	R5824		Each axis manual feedrate B 7th axis (L) [M]
R5777	R5793	R5809	R5825		Each axis manual feedrate B 7th axis (H) [M]
R5778	R5794	R5810	R5826		Each axis manual feedrate B 8th axis (L) [M]
R5779	R5795	R5811	R5827		Each axis manual feedrate B 8th axis (H) [M]
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5828	R5836	R5844	R5852		
R5829	R5837	R5845	R5853		
R5830	R5838	R5846	R5854		
R5831	R5839	R5847	R5855		
R5832	R5840	R5848	R5856		
R5833	R5841	R5849	R5857		
R5834	R5842	R5850	R5858		
R5835	R5843	R5851	R5859		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5860	R5868	R5876	R5884		
R5861	R5869	R5877	R5885		
R5862	R5870	R5878	R5886		
R5863	R5871	R5879	R5887		
R5864	R5872	R5880	R5888		
R5865	R5873	R5881	R5889		
R5866	R5874	R5882	R5890		
R5867	R5875	R5883	R5891		
Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R5892	R5900	R5908	R5916		
R5893	R5901	R5909	R5917		
R5894	R5902	R5910	R5918		
R5895	R5903	R5911	R5919		
R5896	R5904	R5912	R5920		
R5897	R5905	R5913	R5921		
R5898	R5906	R5914	R5922		
R5899	R5907	R5915	R5923		

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R6052	R6060	R6068	R6076		External deceleration speed selection 1st axis ▲
R6053	R6061	R6069	R6077		External deceleration speed selection 2nd axis ▲
R6054	R6062	R6070	R6078		External deceleration speed selection 3rd axis ▲
R6055	R6063	R6071	R6079		External deceleration speed selection 4th axis ▲
R6056	R6064	R6072	R6080		External deceleration speed selection 5th axis ▲
R6057	R6065	R6073	R6081		External deceleration speed selection 6th axis ▲
R6058	R6066	R6074	R6082		External deceleration speed selection 7th axis ▲
R6059	R6067	R6075	R6083		External deceleration speed selection 8th axis ▲

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R6084	R6092	R6100	R6108		Optimum acceleration/deceleration parameter group selection 1st axis ▲
R6085	R6093	R6101	R6109		Optimum acceleration/deceleration parameter group selection 2nd axis ▲
R6086	R6094	R6102	R6110		Optimum acceleration/deceleration parameter group selection 3rd axis ▲
R6087	R6095	R6103	R6111		Optimum acceleration/deceleration parameter group selection 4th axis ▲
R6088	R6096	R6104	R6112		Optimum acceleration/deceleration parameter group selection 5th axis ▲
R6089	R6097	R6105	R6113		Optimum acceleration/deceleration parameter group selection 6th axis ▲
R6090	R6098	R6106	R6114		Optimum acceleration/deceleration parameter group selection 7th axis ▲
R6091	R6099	R6107	R6115		Optimum acceleration/deceleration parameter group selection 8th axis ▲

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R6116	R6124	R6132	R6140		Target machining time 1st axis ▲
R6117	R6125	R6133	R6141		Target machining time 2nd axis ▲
R6118	R6126	R6134	R6142		Target machining time 3rd axis ▲
R6119	R6127	R6135	R6143		Target machining time 4th axis ▲
R6120	R6128	R6136	R6144		Target machining time 5th axis ▲
R6121	R6129	R6137	R6145		Target machining time 6th axis ▲
R6122	R6130	R6138	R6146		Target machining time 7th axis ▲
R6123	R6131	R6139	R6147		Target machining time 8th axis ▲

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.					
$1	$2	$3	$4	Abbrev.	Signal name
R6436	R6444	R6452	R6460		User macro input #1032 (PLC -> NC) (L)
R6437	R6445	R6453	R6461		User macro input #1032 (PLC -> NC) (H)
R6438	R6446	R6454	R6462		User macro input #1033 (PLC -> NC) (L)
R6439	R6447	R6455	R6463		User macro input #1033 (PLC -> NC) (H)
R6440	R6448	R6456	R6464		User macro input #1034 (PLC -> NC) (L)
R6441	R6449	R6457	R6465		User macro input #1034 (PLC -> NC) (H)
R6442	R6450	R6458	R6466		User macro input #1035 (PLC -> NC) (L)
R6443	R6451	R6459	R6467		User macro input #1035 (PLC -> NC) (H)

(Note) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R7000	R7050	R7100	R7150	R7200	R7250	R7300	R7350		Spindle command rotation speed output (L)
R7001	R7051	R7101	R7151	R7201	R7251	R7301	R7351		Spindle command rotation speed output (H)
R7002	R7052	R7102	R7152	R7202	R7252	R7302	R7352	SLSP	Spindle command selection
R7003	R7053	R7103	R7153	R7203	R7253	R7303	R7353		Optimum acceleration/deceleration parameter group selection [spindle] ▲
R7004	R7054	R7104	R7154	R7204	R7254	R7304	R7354		Spindle target machining time ▲
R7005	R7055	R7105	R7155	R7205	R7255	R7305	R7355		
R7006	R7056	R7106	R7156	R7206	R7256	R7306	R7356		
R7007	R7057	R7107	R7157	R7207	R7257	R7307	R7357		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R7008	R7058	R7108	R7158	R7208	R7258	R7308	R7358		S command override
R7009	R7059	R7109	R7159	R7209	R7259	R7309	R7359		Multi-point orientation position data
R7010	R7060	R7110	R7160	R7210	R7260	R7310	R7360	ORDIR	Orientation rotation direction ▲
R7011	R7061	R7111	R7161	R7211	R7261	R7311	R7361		
R7012	R7062	R7112	R7162	R7212	R7262	R7312	R7362		
R7013	R7063	R7113	R7163	R7213	R7263	R7313	R7363		
R7014	R7064	R7114	R7164	R7214	R7264	R7314	R7364		
R7015	R7065	R7115	R7165	R7215	R7265	R7315	R7365		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R7016	R7066	R7116	R7166	R7216	R7266	R7316	R7366		Spindle synchronization reference spindle selection
R7017	R7067	R7117	R7167	R7217	R7267	R7317	R7367		Spindle synchronization Synchronized spindle selection
R7018	R7068	R7118	R7168	R7218	R7268	R7318	R7368		Spindle synchronization Phase shift amount
R7019	R7069	R7119	R7169	R7219	R7269	R7319	R7369		
R7020	R7070	R7120	R7170	R7220	R7270	R7320	R7370		Spindle oscillation amplitude
R7021	R7071	R7121	R7171	R7221	R7271	R7321	R7371		Spindle oscillation frequency
R7022	R7072	R7122	R7172	R7222	R7272	R7322	R7372		
R7023	R7073	R7123	R7173	R7223	R7273	R7323	R7373		

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R7024	R7074	R7124	R7174	R7224	R7274	R7324	R7374		
R7025	R7075	R7125	R7175	R7225	R7275	R7325	R7375		
R7026	R7076	R7126	R7176	R7226	R7276	R7326	R7376		
R7027	R7077	R7127	R7177	R7227	R7277	R7327	R7377		
R7028	R7078	R7128	R7178	R7228	R7278	R7328	R7378		
R7029	R7079	R7129	R7179	R7229	R7279	R7329	R7379		
R7030	R7080	R7130	R7180	R7230	R7280	R7330	R7380		
R7031	R7081	R7131	R7181	R7231	R7281	R7331	R7381		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R12200	R12210	R12220	R12230	R12240	R12250	R12260	R12270		Spindle tool No. (L)
R12201	R12211	R12221	R12231	R12241	R12251	R12261	R12271		Spindle tool No. (H)
R12202	R12212	R12222	R12232	R12242	R12252	R12262	R12272		Standby tool No. (L)
R12203	R12213	R12223	R12233	R12243	R12253	R12263	R12273		Standby tool No. (H)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10600		ATC control parameter	R10608		
R10601			R10609		
R10602			R10610		No.1 magazine number of magazines designation
R10603		Display tool selection parameter	R10611		No.2 magazine number of magazines designation
R10604		AUX data	R10612		No.3 magazine number of magazines designation
R10605			R10613		No.4 magazine number of magazines designation
R10606			R10614		No.5 magazine number of magazines designation
R10607			R10615		No.1 magazine pointer designation

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10616		No.2 magazine pointer designation	R10624		No.1 magazine standby 4 tool (T4-digit)/No.1 magazine standby 2 tool (T8-digit)
R10617		No.3 magazine pointer designation	R10625		No.1 magazine standby 2 tool (T8-digit)
R10618		No.4 magazine pointer designation	R10626		No.1 magazine standby 3 tool (T8-digit)
R10619		No.5 magazine pointer designation	R10627		No.1 magazine standby 3 tool (T8-digit)
R10620		No.1 magazine spindle tool	R10628		No.1 magazine standby 4 tool (T8-digit)
R10621		No.1 magazine standby 1 tool (T4-digit)/ No.1 magazine spindle tool (T8-digit)	R10629		No.1 magazine standby 4 tool (T8-digit)
R10622		No.1 magazine standby 2 tool (T4-digit)/ No.1 magazine standby 1 tool (T8-digit)	R10630		No.2 magazine spindle tool
R10623		No.1 magazine standby 3 tool (T4-digit)/ No.1 magazine standby 1 tool (T8-digit)	R10631		No.2 magazine standby 1 tool (T4-digit)/No.2 magazine spindle tool (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10632		No.2 magazine standby 2 tool (T4-digit)/ No.2 magazine standby 1 tool (T8-digit)	R10640		No.3 magazine spindle tool
R10633		No.2 magazine standby 3 tool (T4-digit)/ No.2 magazine standby 1 tool (T8-digit)	R10641		No.3 magazine standby 1 tool (T4-digit)/No.3 magazine spindle tool (T8-digit)
R10634		No.2 magazine standby 4 tool (T4-digit)/ No.2 magazine standby 2 tool (T8-digit)	R10642		No.3 magazine standby 2 tool (T4-digit)/No.3 magazine standby 1 tool (T8-digit)
R10635		No.2 magazine standby 2 tool (T8-digit)	R10643		No.3 magazine standby 3 tool (T4-digit)/No.3 magazine standby 1 tool (T8-digit)
R10636		No.2 magazine standby 3 tool (T8-digit)	R10644		No.3 magazine standby 4 tool (T4-digit)/No.3 magazine standby 2 tool (T8-digit)
R10637		No.2 magazine standby 3 tool (T8-digit)	R10645		No.3 magazine standby 2 tool (T8-digit)
R10638		No.2 magazine standby 4 tool (T8-digit)	R10646		No.3 magazine standby 3 tool (T8-digit)
R10639		No.2 magazine standby 4 tool (T8-digit)	R10647		No.3 magazine standby 3 tool (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10648		No.3 magazine standby 4 tool (T8-digit)	R10656		No.4 magazine standby 3 tool (T8-digit)
R10649		No.3 magazine standby 4 tool (T8-digit)	R10657		No.4 magazine standby 3 tool (T8-digit)
R10650		No.4 magazine spindle tool	R10658		No.4 magazine standby 4 tool (T8-digit)
R10651		No.4 magazine standby 1 tool (T4-digit)/ No.4 magazine spindle tool (T8-digit)	R10659		No.4 magazine standby 4 tool (T8-digit)
R10652		No.4 magazine standby 2 tool (T4-digit)/ No.4 magazine standby 1 tool (T8-digit)	R10660		No.5 magazine spindle tool
R10653		No.4 magazine standby 3 tool (T4-digit)/ No.4 magazine standby 1 tool (T8-digit)	R10661		No.5 magazine standby 1 tool (T4-digit)/No.5 magazine spindle tool (T8-digit)
R10654		No.4 magazine standby 4 tool (T4-digit)/ No.4 magazine standby 2 tool (T8-digit)	R10662		No.5 magazine standby 2 tool (T4-digit)/No.5 magazine standby 1 tool (T8-digit)
R10655		No.4 magazine standby 2 tool (T8-digit)	R10663		No.5 magazine standby 3 tool (T4-digit)/No.5 magazine standby 1 tool (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10664		No.5 magazine standby 4 tool (T4-digit)/ No.5 magazine standby 2 tool (T8-digit)	R10672		No.1 magazine standby 2 tool D
R10665		No.5 magazine standby 2 tool (T8-digit)	R10673		No.1 magazine standby 3 tool D
R10666		No.5 magazine standby 3 tool (T8-digit)	R10674		No.1 magazine standby 4 tool D
R10667		No.5 magazine standby 3 tool (T8-digit)	R10675		No.2 magazine spindle tool D
R10668		No.5 magazine standby 4 tool (T8-digit)	R10676		No.2 magazine standby 1 tool D
R10669		No.5 magazine standby 4 tool (T8-digit)	R10677		No.2 magazine standby 2 tool D
R10670		No.1 magazine spindle tool D	R10678		No.2 magazine standby 3 tool D
R10671		No.1 magazine standby 1 tool D	R10679		No.2 magazine standby 4 tool D

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10680		No.3 magazine spindle tool D	R10688		No.4 magazine standby 3 tool D
R10681		No.3 magazine standby 1 tool D	R10689		No.4 magazine standby 4 tool D
R10682		No.3 magazine standby 2 tool D	R10690		No.5 magazine spindle tool D
R10683		No.3 magazine standby 3 tool D	R10691		No.5 magazine standby 1 tool D
R10684		No.3 magazine standby 4 tool D	R10692		No.5 magazine standby 2 tool D
R10685		No.4 magazine spindle tool D	R10693		No.5 magazine standby 3 tool D
R10686		No.4 magazine standby 1 tool D	R10694		No.5 magazine standby 4 tool D
R10687		No.4 magazine standby 2 tool D	R10695		No.1 magazine pot head No.

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10696		No.2 magazine pot head No.	R10704		No.1 magazine tool data pot 5 (T4-digit)/pot 3 (T8-digit)
R10697		No.3 magazine pot head No.	R10705		No.1 magazine tool data pot 6 (T4-digit)/pot 3 (T8-digit)
R10698		No.4 magazine pot head No.	R10706		No.1 magazine tool data pot 7 (T4-digit)/pot 4 (T8-digit)
R10699		No.5 magazine pot head No.	R10707		No.1 magazine tool data pot 8 (T4-digit)/pot 4 (T8-digit)
R10700		No.1 magazine tool data pot 1	R10708		No.1 magazine tool data pot 9 (T4-digit)/pot 5 (T8-digit)
R10701		No.1 magazine tool data pot 2 (T4-digit)/ pot 1 (T8-digit)	R10709		No.1 magazine tool data pot 10 (T4-digit)/pot 5 (T8-digit)
R10702		No.1 magazine tool data pot 3 (T4-digit)/ pot 2 (T8-digit)	R10710		No.1 magazine tool data pot 11 (T4-digit)/pot 6 (T8-digit)
R10703		No.1 magazine tool data pot 4 (T4-digit)/ pot 2 (T8-digit)	R10711		No.1 magazine tool data pot 12 (T4-digit)/pot 6 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10712		No.1 magazine tool data pot 13 (T4-digit)/ pot 7 (T8-digit)	R10720		No.1 magazine tool data pot 21 (T4-digit)/pot 11 (T8-digit)
R10713		No.1 magazine tool data pot 14 (T4-digit)/ pot 7 (T8-digit)	R10721		No.1 magazine tool data pot 22 (T4-digit)/pot 11 (T8-digit)
R10714		No.1 magazine tool data pot 15 (T4-digit)/ pot 8 (T8-digit)	R10722		No.1 magazine tool data pot 23 (T4-digit)/pot 12 (T8-digit)
R10715		No.1 magazine tool data pot 16 (T4-digit)/ pot 8 (T8-digit)	R10723		No.1 magazine tool data pot 24 (T4-digit)/pot 12 (T8-digit)
R10716		No.1 magazine tool data pot 17 (T4-digit)/ pot 9 (T8-digit)	R10724		No.1 magazine tool data pot 25 (T4-digit)/pot 13 (T8-digit)
R10717		No.1 magazine tool data pot 18 (T4-digit)/ pot 9 (T8-digit)	R10725		No.1 magazine tool data pot 26 (T4-digit)/pot 13 (T8-digit)
R10718		No.1 magazine tool data pot 19 (T4-digit)/ pot 10 (T8-digit)	R10726		No.1 magazine tool data pot 27 (T4-digit)/pot 14 (T8-digit)
R10719		No.1 magazine tool data pot 20 (T4-digit)/ pot 10 (T8-digit)	R10727		No.1 magazine tool data pot 28 (T4-digit)/pot 14 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10728		No.1 magazine tool data pot 29 (T4-digit)/ pot 15 (T8-digit)	R10736		No.1 magazine tool data pot 37 (T4-digit)/pot 19 (T8-digit)
R10729		No.1 magazine tool data pot 30 (T4-digit)/ pot 15 (T8-digit)	R10737		No.1 magazine tool data pot 38 (T4-digit)/pot 19 (T8-digit)
R10730		No.1 magazine tool data pot 31 (T4-digit)/ pot 16 (T8-digit)	R10738		No.1 magazine tool data pot 39 (T4-digit)/pot 20 (T8-digit)
R10731		No.1 magazine tool data pot 32 (T4-digit)/ pot 16 (T8-digit)	R10739		No.1 magazine tool data pot 40 (T4-digit)/pot 20 (T8-digit)
R10732		No.1 magazine tool data pot 33 (T4-digit)/ pot 17 (T8-digit)	R10740		No.1 magazine tool data pot 41 (T4-digit)/pot 21 (T8-digit)
R10733		No.1 magazine tool data pot 34 (T4-digit)/ pot 17 (T8-digit)	R10741		No.1 magazine tool data pot 42 (T4-digit)/pot 21 (T8-digit)
R10734		No.1 magazine tool data pot 35 (T4-digit)/ pot 18 (T8-digit)	R10742		No.1 magazine tool data pot 43 (T4-digit)/pot 22 (T8-digit)
R10735		No.1 magazine tool data pot 36 (T4-digit)/ pot 18 (T8-digit)	R10743		No.1 magazine tool data pot 44 (T4-digit)/pot 22 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10744		No.1 magazine tool data pot 45 (T4-digit)/ pot 23 (T8-digit)	R10752		No.1 magazine tool data pot 53 (T4-digit)/pot 27 (T8-digit)
R10745		No.1 magazine tool data pot 46 (T4-digit)/ pot 23 (T8-digit)	R10753		No.1 magazine tool data pot 54 (T4-digit)/pot 27 (T8-digit)
R10746		No.1 magazine tool data pot 47 (T4-digit)/ pot 24 (T8-digit)	R10754		No.1 magazine tool data pot 55 (T4-digit)/pot 28 (T8-digit)
R10747		No.1 magazine tool data pot 48 (T4-digit)/ pot 24 (T8-digit)	R10755		No.1 magazine tool data pot 56 (T4-digit)/pot 28 (T8-digit)
R10748		No.1 magazine tool data pot 49 (T4-digit)/ pot 25 (T8-digit)	R10756		No.1 magazine tool data pot 57 (T4-digit)/pot 29 (T8-digit)
R10749		No.1 magazine tool data pot 50 (T4-digit)/ pot 25 (T8-digit)	R10757		No.1 magazine tool data pot 58 (T4-digit)/pot 29 (T8-digit)
R10750		No.1 magazine tool data pot 51 (T4-digit)/ pot 26 (T8-digit)	R10758		No.1 magazine tool data pot 59 (T4-digit)/pot 30 (T8-digit)
R10751		No.1 magazine tool data pot 52 (T4-digit)/ pot 26 (T8-digit)	R10759		No.1 magazine tool data pot 60 (T4-digit)/pot 30 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10760		No.1 magazine tool data pot 61 (T4-digit)/ pot 31 (T8-digit)	R10768		No.1 magazine tool data pot 69 (T4-digit)/pot 35 (T8-digit)
R10761		No.1 magazine tool data pot 62 (T4-digit)/ pot 31 (T8-digit)	R10769		No.1 magazine tool data pot 70 (T4-digit)/pot 35 (T8-digit)
R10762		No.1 magazine tool data pot 63 (T4-digit)/ pot 32 (T8-digit)	R10770		No.1 magazine tool data pot 71 (T4-digit)/pot 36 (T8-digit)
R10763		No.1 magazine tool data pot 64 (T4-digit)/ pot 32 (T8-digit)	R10771		No.1 magazine tool data pot 72 (T4-digit)/pot 36 (T8-digit)
R10764		No.1 magazine tool data pot 65 (T4-digit)/ pot 33 (T8-digit)	R10772		No.1 magazine tool data pot 73 (T4-digit)/pot 37 (T8-digit)
R10765		No.1 magazine tool data pot 66 (T4-digit)/ pot 33 (T8-digit)	R10773		No.1 magazine tool data pot 74 (T4-digit)/pot 37 (T8-digit)
R10766		No.1 magazine tool data pot 67 (T4-digit)/ pot 34 (T8-digit)	R10774		No.1 magazine tool data pot 75 (T4-digit)/pot 38 (T8-digit)
R10767		No.1 magazine tool data pot 68 (T4-digit)/ pot 34 (T8-digit)	R10775		No.1 magazine tool data pot 76 (T4-digit)/pot 38 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10776		No.1 magazine tool data pot 77 (T4-digit)/ pot 39 (T8-digit)	R10784		No.1 magazine tool data pot 85 (T4-digit)/pot 43 (T8-digit)
R10777		No.1 magazine tool data pot 78 (T4-digit)/ pot 39 (T8-digit)	R10785		No.1 magazine tool data pot 86 (T4-digit)/pot 43 (T8-digit)
R10778		No.1 magazine tool data pot 79 (T4-digit)/ pot 40 (T8-digit)	R10786		No.1 magazine tool data pot 87 (T4-digit)/pot 44 (T8-digit)
R10779		No.1 magazine tool data pot 80 (T4-digit)/ pot 40 (T8-digit)	R10787		No.1 magazine tool data pot 88 (T4-digit)/pot 44 (T8-digit)
R10780		No.1 magazine tool data pot 81 (T4-digit)/ pot 41 (T8-digit)	R10788		No.1 magazine tool data pot 89 (T4-digit)/pot 45 (T8-digit)
R10781		No.1 magazine tool data pot 82 (T4-digit)/ pot 41 (T8-digit)	R10789		No.1 magazine tool data pot 90 (T4-digit)/pot 45 (T8-digit)
R10782		No.1 magazine tool data pot 83 (T4-digit)/ pot 42 (T8-digit)	R10790		No.1 magazine tool data pot 91 (T4-digit)/pot 46 (T8-digit)
R10783		No.1 magazine tool data pot 84 (T4-digit)/ pot 42 (T8-digit)	R10791		No.1 magazine tool data pot 92 (T4-digit)/pot 46 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10792		No.1 magazine tool data pot 93 (T4-digit)/ pot 47 (T8-digit)	R10800		No.1 magazine tool data pot 101 (T4-digit)/pot 51 (T8-digit)
R10793		No.1 magazine tool data pot 94 (T4-digit)/ pot 47 (T8-digit)	R10801		No.1 magazine tool data pot 102 (T4-digit)/pot 51 (T8-digit)
R10794		No.1 magazine tool data pot 95 (T4-digit)/ pot 48 (T8-digit)	R10802		No.1 magazine tool data pot 103 (T4-digit)/pot 52 (T8-digit)
R10795		No.1 magazine tool data pot 96 (T4-digit)/ pot 48 (T8-digit)	R10803		No.1 magazine tool data pot 104 (T4-digit)/pot 52 (T8-digit)
R10796		No.1 magazine tool data pot 97 (T4-digit)/ pot 49 (T8-digit)	R10804		No.1 magazine tool data pot 105 (T4-digit)/pot 53 (T8-digit)
R10797		No.1 magazine tool data pot 98 (T4-digit)/ pot 49 (T8-digit)	R10805		No.1 magazine tool data pot 106 (T4-digit)/pot 53 (T8-digit)
R10798		No.1 magazine tool data pot 99 (T4-digit)/ pot 50 (T8-digit)	R10806		No.1 magazine tool data pot 107 (T4-digit)/pot 54 (T8-digit)
R10799		No.1 magazine tool data pot 100 (T4-digit)/ pot 50 (T8-digit)	R10807		No.1 magazine tool data pot 108 (T4-digit)/pot 54 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10808		No.1 magazine tool data pot 109 (T4-digit)/ pot 55 (T8-digit)	R10816		No.1 magazine tool data pot 117 (T4-digit)/pot 59 (T8-digit)
R10809		No.1 magazine tool data pot 110 (T4-digit)/ pot 55 (T8-digit)	R10817		No.1 magazine tool data pot 118 (T4-digit)/pot 59 (T8-digit)
R10810		No.1 magazine tool data pot 111 (T4-digit)/ pot 56 (T8-digit)	R10818		No.1 magazine tool data pot 119 (T4-digit)/pot 60 (T8-digit)
R10811		No.1 magazine tool data pot 112 (T4-digit)/ pot 56 (T8-digit)	R10819		No.1 magazine tool data pot 120 (T4-digit)/pot 60 (T8-digit)
R10812		No.1 magazine tool data pot 113 (T4-digit)/ pot 57 (T8-digit)	R10820		No.1 magazine tool data pot 61 (T8-digit)
R10813		No.1 magazine tool data pot 114 (T4-digit)/ pot 57 (T8-digit)	R10821		No.1 magazine tool data pot 61 (T8-digit)
R10814		No.1 magazine tool data pot 115 (T4-digit)/ pot 58 (T8-digit)	R10822		No.1 magazine tool data pot 62 (T8-digit)
R10815		No.1 magazine tool data pot 116 (T4-digit)/ pot 58 (T8-digit)	R10823		No.1 magazine tool data pot 62 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10824		No.1 magazine tool data pot 63 (T8-digit)	R10832		No.1 magazine tool data pot 67 (T8-digit)
R10825		No.1 magazine tool data pot 63 (T8-digit)	R10833		No.1 magazine tool data pot 67 (T8-digit)
R10826		No.1 magazine tool data pot 64 (T8-digit)	R10834		No.1 magazine tool data pot 68 (T8-digit)
R10827		No.1 magazine tool data pot 64 (T8-digit)	R10835		No.1 magazine tool data pot 68 (T8-digit)
R10828		No.1 magazine tool data pot 65 (T8-digit)	R10836		No.1 magazine tool data pot 69 (T8-digit)
R10829		No.1 magazine tool data pot 65 (T8-digit)	R10837		No.1 magazine tool data pot 69 (T8-digit)
R10830		No.1 magazine tool data pot 66 (T8-digit)	R10838		No.1 magazine tool data pot 70 (T8-digit)
R10831		No.1 magazine tool data pot 66 (T8-digit)	R10839		No.1 magazine tool data pot 70 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10840		No.1 magazine tool data pot 71 (T8-digit)	R10848		No.1 magazine tool data pot 75 (T8-digit)
R10841		No.1 magazine tool data pot 71 (T8-digit)	R10849		No.1 magazine tool data pot 75 (T8-digit)
R10842		No.1 magazine tool data pot 72 (T8-digit)	R10850		No.1 magazine tool data pot 76 (T8-digit)
R10843		No.1 magazine tool data pot 72 (T8-digit)	R10851		No.1 magazine tool data pot 76 (T8-digit)
R10844		No.1 magazine tool data pot 73 (T8-digit)	R10852		No.1 magazine tool data pot 77 (T8-digit)
R10845		No.1 magazine tool data pot 73 (T8-digit)	R10853		No.1 magazine tool data pot 77 (T8-digit)
R10846		No.1 magazine tool data pot 74 (T8-digit)	R10854		No.1 magazine tool data pot 78 (T8-digit)
R10847		No.1 magazine tool data pot 74 (T8-digit)	R10855		No.1 magazine tool data pot 78 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10856		No.1 magazine tool data pot 79 (T8-digit)	R10864		No.1 magazine tool data pot 83 (T8-digit)
R10857		No.1 magazine tool data pot 79 (T8-digit)	R10865		No.1 magazine tool data pot 83 (T8-digit)
R10858		No.1 magazine tool data pot 80 (T8-digit)	R10866		No.1 magazine tool data pot 84 (T8-digit)
R10859		No.1 magazine tool data pot 80 (T8-digit)	R10867		No.1 magazine tool data pot 84 (T8-digit)
R10860		No.1 magazine tool data pot 81 (T8-digit)	R10868		No.1 magazine tool data pot 85 (T8-digit)
R10861		No.1 magazine tool data pot 81 (T8-digit)	R10869		No.1 magazine tool data pot 85 (T8-digit)
R10862		No.1 magazine tool data pot 82 (T8-digit)	R10870		No.1 magazine tool data pot 86 (T8-digit)
R10863		No.1 magazine tool data pot 82 (T8-digit)	R10871		No.1 magazine tool data pot 86 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10872		No.1 magazine tool data pot 87 (T8-digit)	R10880		No.1 magazine tool data pot 91 (T8-digit)
R10873		No.1 magazine tool data pot 87 (T8-digit)	R10881		No.1 magazine tool data pot 91 (T8-digit)
R10874		No.1 magazine tool data pot 88 (T8-digit)	R10882		No.1 magazine tool data pot 92 (T8-digit)
R10875		No.1 magazine tool data pot 88 (T8-digit)	R10883		No.1 magazine tool data pot 92 (T8-digit)
R10876		No.1 magazine tool data pot 89 (T8-digit)	R10884		No.1 magazine tool data pot 93 (T8-digit)
R10877		No.1 magazine tool data pot 89 (T8-digit)	R10885		No.1 magazine tool data pot 93 (T8-digit)
R10878		No.1 magazine tool data pot 90 (T8-digit)	R10886		No.1 magazine tool data pot 94 (T8-digit)
R10879		No.1 magazine tool data pot 90 (T8-digit)	R10887		No.1 magazine tool data pot 94 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10888		No.1 magazine tool data pot 95 (T8-digit)	R10896		No.1 magazine tool data pot 99 (T8-digit)
R10889		No.1 magazine tool data pot 95 (T8-digit)	R10897		No.1 magazine tool data pot 99 (T8-digit)
R10890		No.1 magazine tool data pot 96 (T8-digit)	R10898		No.1 magazine tool data pot 100 (T8-digit)
R10891		No.1 magazine tool data pot 96 (T8-digit)	R10899		No.1 magazine tool data pot 100 (T8-digit)
R10892		No.1 magazine tool data pot 97 (T8-digit)	R10900		No.1 magazine tool data pot 101 (T8-digit)
R10893		No.1 magazine tool data pot 97 (T8-digit)	R10901		No.1 magazine tool data pot 101 (T8-digit)
R10894		No.1 magazine tool data pot 98 (T8-digit)	R10902		No.1 magazine tool data pot 102 (T8-digit)
R10895		No.1 magazine tool data pot 98 (T8-digit)	R10903		No.1 magazine tool data pot 102 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10904		No.1 magazine tool data pot 103 (T8-digit)	R10912		No.1 magazine tool data pot 107 (T8-digit)
R10905		No.1 magazine tool data pot 103 (T8-digit)	R10913		No.1 magazine tool data pot 107 (T8-digit)
R10906		No.1 magazine tool data pot 104 (T8-digit)	R10914		No.1 magazine tool data pot 108 (T8-digit)
R10907		No.1 magazine tool data pot 104 (T8-digit)	R10915		No.1 magazine tool data pot 108 (T8-digit)
R10908		No.1 magazine tool data pot 105 (T8-digit)	R10916		No.1 magazine tool data pot 109 (T8-digit)
R10909		No.1 magazine tool data pot 105 (T8-digit)	R10917		No.1 magazine tool data pot 109 (T8-digit)
R10910		No.1 magazine tool data pot 106 (T8-digit)	R10918		No.1 magazine tool data pot 110 (T8-digit)
R10911		No.1 magazine tool data pot 106 (T8-digit)	R10919		No.1 magazine tool data pot 110 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10920		No.1 magazine tool data pot 111 (T8-digit)	R10928		No.1 magazine tool data pot 115 (T8-digit)
R10921		No.1 magazine tool data pot 111 (T8-digit)	R10929		No.1 magazine tool data pot 115 (T8-digit)
R10922		No.1 magazine tool data pot 112 (T8-digit)	R10930		No.1 magazine tool data pot 116 (T8-digit)
R10923		No.1 magazine tool data pot 112 (T8-digit)	R10931		No.1 magazine tool data pot 116 (T8-digit)
R10924		No.1 magazine tool data pot 113 (T8-digit)	R10932		No.1 magazine tool data pot 117 (T8-digit)
R10925		No.1 magazine tool data pot 113 (T8-digit)	R10933		No.1 magazine tool data pot 117 (T8-digit)
R10926		No.1 magazine tool data pot 114 (T8-digit)	R10934		No.1 magazine tool data pot 118 (T8-digit)
R10927		No.1 magazine tool data pot 114 (T8-digit)	R10935		No.1 magazine tool data pot 118 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10936		No.1 magazine tool data pot 119 (T8-digit)	R10944		No.1 magazine tool data (Aux.D) pot 5
R10937		No.1 magazine tool data pot 119 (T8-digit)	R10945		No.1 magazine tool data (Aux.D) pot 6
R10938		No.1 magazine tool data pot 120 (T8-digit)	R10946		No.1 magazine tool data (Aux.D) pot 7
R10939		No.1 magazine tool data pot 120 (T8-digit)	R10947		No.1 magazine tool data (Aux.D) pot 8
R10940		No.1 magazine tool data (Aux.D) pot 1	R10948		No.1 magazine tool data (Aux.D) pot 9
R10941		No.1 magazine tool data (Aux.D) pot 2	R10949		No.1 magazine tool data (Aux.D) pot 10
R10942		No.1 magazine tool data (Aux.D) pot 3	R10950		No.1 magazine tool data (Aux.D) pot 11
R10943		No.1 magazine tool data (Aux.D) pot 4	R10951		No.1 magazine tool data (Aux.D) pot 12

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10952		No.1 magazine tool data (Aux.D) pot 13	R10960		No.1 magazine tool data (Aux.D) pot 21
R10953		No.1 magazine tool data (Aux.D) pot 14	R10961		No.1 magazine tool data (Aux.D) pot 22
R10954		No.1 magazine tool data (Aux.D) pot 15	R10962		No.1 magazine tool data (Aux.D) pot 23
R10955		No.1 magazine tool data (Aux.D) pot 16	R10963		No.1 magazine tool data (Aux.D) pot 24
R10956		No.1 magazine tool data (Aux.D) pot 17	R10964		No.1 magazine tool data (Aux.D) pot 25
R10957		No.1 magazine tool data (Aux.D) pot 18	R10965		No.1 magazine tool data (Aux.D) pot 26
R10958		No.1 magazine tool data (Aux.D) pot 19	R10966		No.1 magazine tool data (Aux.D) pot 27
R10959		No.1 magazine tool data (Aux.D) pot 20	R10967		No.1 magazine tool data (Aux.D) pot 28

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10968		No.1 magazine tool data (Aux.D) pot 29	R10976		No.1 magazine tool data (Aux.D) pot 37
R10969		No.1 magazine tool data (Aux.D) pot 30	R10977		No.1 magazine tool data (Aux.D) pot 38
R10970		No.1 magazine tool data (Aux.D) pot 31	R10978		No.1 magazine tool data (Aux.D) pot 39
R10971		No.1 magazine tool data (Aux.D) pot 32	R10979		No.1 magazine tool data (Aux.D) pot 40
R10972		No.1 magazine tool data (Aux.D) pot 33	R10980		No.1 magazine tool data (Aux.D) pot 41
R10973		No.1 magazine tool data (Aux.D) pot 34	R10981		No.1 magazine tool data (Aux.D) pot 42
R10974		No.1 magazine tool data (Aux.D) pot 35	R10982		No.1 magazine tool data (Aux.D) pot 43
R10975		No.1 magazine tool data (Aux.D) pot 36	R10983		No.1 magazine tool data (Aux.D) pot 44

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R10984		No.1 magazine tool data (Aux.D) pot 45	R10992		No.1 magazine tool data (Aux.D) pot 53
R10985		No.1 magazine tool data (Aux.D) pot 46	R10993		No.1 magazine tool data (Aux.D) pot 54
R10986		No.1 magazine tool data (Aux.D) pot 47	R10994		No.1 magazine tool data (Aux.D) pot 55
R10987		No.1 magazine tool data (Aux.D) pot 48	R10995		No.1 magazine tool data (Aux.D) pot 56
R10988		No.1 magazine tool data (Aux.D) pot 49	R10996		No.1 magazine tool data (Aux.D) pot 57
R10989		No.1 magazine tool data (Aux.D) pot 50	R10997		No.1 magazine tool data (Aux.D) pot 58
R10990		No.1 magazine tool data (Aux.D) pot 51	R10998		No.1 magazine tool data (Aux.D) pot 59
R10991		No.1 magazine tool data (Aux.D) pot 52	R10999		No.1 magazine tool data (Aux.D) pot 60

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11000		No.1 magazine tool data (Aux.D) pot 61	R11008		No.1 magazine tool data (Aux.D) pot 69
R11001		No.1 magazine tool data (Aux.D) pot 62	R11009		No.1 magazine tool data (Aux.D) pot 70
R11002		No.1 magazine tool data (Aux.D) pot 63	R11010		No.1 magazine tool data (Aux.D) pot 71
R11003		No.1 magazine tool data (Aux.D) pot 64	R11011		No.1 magazine tool data (Aux.D) pot 72
R11004		No.1 magazine tool data (Aux.D) pot 65	R11012		No.1 magazine tool data (Aux.D) pot 73
R11005		No.1 magazine tool data (Aux.D) pot 66	R11013		No.1 magazine tool data (Aux.D) pot 74
R11006		No.1 magazine tool data (Aux.D) pot 67	R11014		No.1 magazine tool data (Aux.D) pot 75
R11007		No.1 magazine tool data (Aux.D) pot 68	R11015		No.1 magazine tool data (Aux.D) pot 76

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11016		No.1 magazine tool data (Aux.D) pot 77	R11024		No.1 magazine tool data (Aux.D) pot 85
R11017		No.1 magazine tool data (Aux.D) pot 78	R11025		No.1 magazine tool data (Aux.D) pot 86
R11018		No.1 magazine tool data (Aux.D) pot 79	R11026		No.1 magazine tool data (Aux.D) pot 87
R11019		No.1 magazine tool data (Aux.D) pot 80	R11027		No.1 magazine tool data (Aux.D) pot 88
R11020		No.1 magazine tool data (Aux.D) pot 81	R11028		No.1 magazine tool data (Aux.D) pot 89
R11021		No.1 magazine tool data (Aux.D) pot 82	R11029		No.1 magazine tool data (Aux.D) pot 90
R11022		No.1 magazine tool data (Aux.D) pot 83	R11030		No.1 magazine tool data (Aux.D) pot 91
R11023		No.1 magazine tool data (Aux.D) pot 84	R11031		No.1 magazine tool data (Aux.D) pot 92

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11032		No.1 magazine tool data (Aux.D) pot 93	R11040		No.1 magazine tool data (Aux.D) pot 101
R11033		No.1 magazine tool data (Aux.D) pot 94	R11041		No.1 magazine tool data (Aux.D) pot 102
R11034		No.1 magazine tool data (Aux.D) pot 95	R11042		No.1 magazine tool data (Aux.D) pot 103
R11035		No.1 magazine tool data (Aux.D) pot 96	R11043		No.1 magazine tool data (Aux.D) pot 104
R11036		No.1 magazine tool data (Aux.D) pot 97	R11044		No.1 magazine tool data (Aux.D) pot 105
R11037		No.1 magazine tool data (Aux.D) pot 98	R11045		No.1 magazine tool data (Aux.D) pot 106
R11038		No.1 magazine tool data (Aux.D) pot 99	R11046		No.1 magazine tool data (Aux.D) pot 107
R11039		No.1 magazine tool data (Aux.D) pot 100	R11047		No.1 magazine tool data (Aux.D) pot 108

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11048		No.1 magazine tool data (Aux.D) pot 109	R11056		No.1 magazine tool data (Aux.D) pot 117
R11049		No.1 magazine tool data (Aux.D) pot 110	R11057		No.1 magazine tool data (Aux.D) pot 118
R11050		No.1 magazine tool data (Aux.D) pot 111	R11058		No.1 magazine tool data (Aux.D) pot 119
R11051		No.1 magazine tool data (Aux.D) pot 112	R11059		No.1 magazine tool data (Aux.D) pot 120
R11052		No.1 magazine tool data (Aux.D) pot 113	R11060		No.2 magazine tool data pot 1
R11053		No.1 magazine tool data (Aux.D) pot 114	R11061		No.2 magazine tool data pot 2 (T4-digit)/pot 1 (T8-digit)
R11054		No.1 magazine tool data (Aux.D) pot 115	R11062		No.2 magazine tool data pot 3 (T4-digit)/pot 2 (T8-digit)
R11055		No.1 magazine tool data (Aux.D) pot 116	R11063		No.2 magazine tool data pot 4 (T4-digit)/pot 2 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11064		No.2 magazine tool data pot 5 (T4-digit)/ pot 3 (T8-digit)	R11072		No.2 magazine tool data pot 13 (T4-digit)/pot 7 (T8-digit)
R11065		No.2 magazine tool data pot 6 (T4-digit)/ pot 3 (T8-digit)	R11073		No.2 magazine tool data pot 14 (T4-digit)/pot 7 (T8-digit)
R11066		No.2 magazine tool data pot 7 (T4-digit)/ pot 4 (T8-digit)	R11074		No.2 magazine tool data pot 15 (T4-digit)/pot 8 (T8-digit)
R11067		No.2 magazine tool data pot 8 (T4-digit)/ pot 4 (T8-digit)	R11075		No.2 magazine tool data pot 16 (T4-digit)/pot 8 (T8-digit)
R11068		No.2 magazine tool data pot 9 (T4-digit)/ pot 5 (T8-digit)	R11076		No.2 magazine tool data pot 17 (T4-digit)/pot 9 (T8-digit)
R11069		No.2 magazine tool data pot 10 (T4-digit)/ pot 5 (T8-digit)	R11077		No.2 magazine tool data pot 18 (T4-digit)/pot 9 (T8-digit)
R11070		No.2 magazine tool data pot 11 (T4-digit)/ pot 6 (T8-digit)	R11078		No.2 magazine tool data pot 19 (T4-digit)/pot 10 (T8-digit)
R11071		No.2 magazine tool data pot 12 (T4-digit)/ pot 6 (T8-digit)	R11079		No.2 magazine tool data pot 20 (T4-digit)/pot 10 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11080		No.2 magazine tool data pot 21 (T4-digit)/ pot 11 (T8-digit)	R11088		No.2 magazine tool data pot 29 (T4-digit)/pot 15 (T8-digit)
R11081		No.2 magazine tool data pot 22 (T4-digit)/ pot 11 (T8-digit)	R11089		No.2 magazine tool data pot 30 (T4-digit)/pot 15 (T8-digit)
R11082		No.2 magazine tool data pot 23 (T4-digit)/ pot 12 (T8-digit)	R11090		No.2 magazine tool data pot 31 (T4-digit)/pot 16 (T8-digit)
R11083		No.2 magazine tool data pot 24 (T4-digit)/ pot 12 (T8-digit)	R11091		No.2 magazine tool data pot 32 (T4-digit)/pot 16 (T8-digit)
R11084		No.2 magazine tool data pot 25 (T4-digit)/ pot 13 (T8-digit)	R11092		No.2 magazine tool data pot 33 (T4-digit)/pot 17 (T8-digit)
R11085		No.2 magazine tool data pot 26 (T4-digit)/ pot 13 (T8-digit)	R11093		No.2 magazine tool data pot 34 (T4-digit)/pot 17 (T8-digit)
R11086		No.2 magazine tool data pot 27 (T4-digit)/ pot 14 (T8-digit)	R11094		No.2 magazine tool data pot 35 (T4-digit)/pot 18 (T8-digit)
R11087		No.2 magazine tool data pot 28 (T4-digit)/ pot 14 (T8-digit)	R11095		No.2 magazine tool data pot 36 (T4-digit)/pot 18 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11096		No.2 magazine tool data pot 37 (T4-digit)/ pot 19 (T8-digit)	R11104		No.2 magazine tool data pot 45 (T4-digit)/pot 23 (T8-digit)
R11097		No.2 magazine tool data pot 38 (T4-digit)/ pot 19 (T8-digit)	R11105		No.2 magazine tool data pot 46 (T4-digit)/pot 23 (T8-digit)
R11098		No.2 magazine tool data pot 39 (T4-digit)/ pot 20 (T8-digit)	R11106		No.2 magazine tool data pot 47 (T4-digit)/pot 24 (T8-digit)
R11099		No.2 magazine tool data pot 40 (T4-digit)/ pot 20 (T8-digit)	R11107		No.2 magazine tool data pot 48 (T4-digit)/pot 24 (T8-digit)
R11100		No.2 magazine tool data pot 41 (T4-digit)/ pot 21 (T8-digit)	R11108		No.2 magazine tool data pot 49 (T4-digit)/pot 25 (T8-digit)
R11101		No.2 magazine tool data pot 42 (T4-digit)/ pot 21 (T8-digit)	R11109		No.2 magazine tool data pot 50 (T4-digit)/pot 25 (T8-digit)
R11102		No.2 magazine tool data pot 43 (T4-digit)/ pot 22 (T8-digit)	R11110		No.2 magazine tool data pot 51 (T4-digit)/pot 26 (T8-digit)
R11103		No.2 magazine tool data pot 44 (T4-digit)/ pot 22 (T8-digit)	R11111		No.2 magazine tool data pot 52 (T4-digit)/pot 26 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11112		No.2 magazine tool data pot 53 (T4-digit)/ pot 27 (T8-digit)	R11120		No.2 magazine tool data pot 61 (T4-digit)/pot 31 (T8-digit)
R11113		No.2 magazine tool data pot 54 (T4-digit)/ pot 27 (T8-digit)	R11121		No.2 magazine tool data pot 62 (T4-digit)/pot 31 (T8-digit)
R11114		No.2 magazine tool data pot 55 (T4-digit)/ pot 28 (T8-digit)	R11122		No.2 magazine tool data pot 63 (T4-digit)/pot 32 (T8-digit)
R11115		No.2 magazine tool data pot 56 (T4-digit)/ pot 28 (T8-digit)	R11123		No.2 magazine tool data pot 64 (T4-digit)/pot 32 (T8-digit)
R11116		No.2 magazine tool data pot 57 (T4-digit)/ pot 29 (T8-digit)	R11124		No.2 magazine tool data pot 65 (T4-digit)/pot 33 (T8-digit)
R11117		No.2 magazine tool data pot 58 (T4-digit)/ pot 29 (T8-digit)	R11125		No.2 magazine tool data pot 66 (T4-digit)/pot 33 (T8-digit)
R11118		No.2 magazine tool data pot 59 (T4-digit)/ pot 30 (T8-digit)	R11126		No.2 magazine tool data pot 67 (T4-digit)/pot 34 (T8-digit)
R11119		No.2 magazine tool data pot 60 (T4-digit)/ pot 30 (T8-digit)	R11127		No.2 magazine tool data pot 68 (T4-digit)/pot 34 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11128		No.2 magazine tool data pot 69 (T4-digit)/ pot 35 (T8-digit)	R11136		No.2 magazine tool data pot 77 (T4-digit)/pot 39 (T8-digit)
R11129		No.2 magazine tool data pot 70 (T4-digit)/ pot 35 (T8-digit)	R11137		No.2 magazine tool data pot 78 (T4-digit)/pot 39 (T8-digit)
R11130		No.2 magazine tool data pot 71 (T4-digit)/ pot 36 (T8-digit)	R11138		No.2 magazine tool data pot 79 (T4-digit)/pot 40 (T8-digit)
R11131		No.2 magazine tool data pot 72 (T4-digit)/ pot 36 (T8-digit)	R11139		No.2 magazine tool data pot 80 (T4-digit)/pot 40 (T8-digit)
R11132		No.2 magazine tool data pot 73 (T4-digit)/ pot 37 (T8-digit)	R11140		No.2 magazine tool data pot 81 (T4-digit)/pot 41 (T8-digit)
R11133		No.2 magazine tool data pot 74 (T4-digit)/ pot 37 (T8-digit)	R11141		No.2 magazine tool data pot 82 (T4-digit)/pot 41 (T8-digit)
R11134		No.2 magazine tool data pot 75 (T4-digit)/ pot 38 (T8-digit)	R11142		No.2 magazine tool data pot 83 (T4-digit)/pot 42 (T8-digit)
R11135		No.2 magazine tool data pot 76 (T4-digit)/ pot 38 (T8-digit)	R11143		No.2 magazine tool data pot 84 (T4-digit)/pot 42 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11144		No.2 magazine tool data pot 85 (T4-digit)/ pot 43 (T8-digit)	R11152		No.2 magazine tool data pot 93 (T4-digit)/pot 47 (T8-digit)
R11145		No.2 magazine tool data pot 86 (T4-digit)/ pot 43 (T8-digit)	R11153		No.2 magazine tool data pot 94 (T4-digit)/pot 47 (T8-digit)
R11146		No.2 magazine tool data pot 87 (T4-digit)/ pot 44 (T8-digit)	R11154		No.2 magazine tool data pot 95 (T4-digit)/pot 48 (T8-digit)
R11147		No.2 magazine tool data pot 88 (T4-digit)/ pot 44 (T8-digit)	R11155		No.2 magazine tool data pot 96 (T4-digit)/pot 48 (T8-digit)
R11148		No.2 magazine tool data pot 89 (T4-digit)/ pot 45 (T8-digit)	R11156		No.2 magazine tool data pot 97 (T4-digit)/pot 49 (T8-digit)
R11149		No.2 magazine tool data pot 90 (T4-digit)/ pot 45 (T8-digit)	R11157		No.2 magazine tool data pot 98 (T4-digit)/pot 49 (T8-digit)
R11150		No.2 magazine tool data pot 91 (T4-digit)/ pot 46 (T8-digit)	R11158		No.2 magazine tool data pot 99 (T4-digit)/pot 50 (T8-digit)
R11151		No.2 magazine tool data pot 92 (T4-digit)/ pot 46 (T8-digit)	R11159		No.2 magazine tool data pot 100 (T4-digit)/pot 50 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11160		No.2 magazine tool data pot 101 (T4-digit)/ pot 51 (T8-digit)	R11168		No.2 magazine tool data pot 109 (T4-digit)/pot 55 (T8-digit)
R11161		No.2 magazine tool data pot 102 (T4-digit)/ pot 51 (T8-digit)	R11169		No.2 magazine tool data pot 110 (T4-digit)/pot 55 (T8-digit)
R11162		No.2 magazine tool data pot 103 (T4-digit)/ pot 52 (T8-digit)	R11170		No.2 magazine tool data pot 111 (T4-digit)/pot 56 (T8-digit)
R11163		No.2 magazine tool data pot 104 (T4-digit)/ pot 52 (T8-digit)	R11171		No.2 magazine tool data pot 112 (T4-digit)/pot 56 (T8-digit)
R11164		No.2 magazine tool data pot 105 (T4-digit)/ pot 53 (T8-digit)	R11172		No.2 magazine tool data pot 113 (T4-digit)/pot 57 (T8-digit)
R11165		No.2 magazine tool data pot 106 (T4-digit)/ pot 53 (T8-digit)	R11173		No.2 magazine tool data pot 114 (T4-digit)/pot 57 (T8-digit)
R11166		No.2 magazine tool data pot 107 (T4-digit)/ pot 54 (T8-digit)	R11174		No.2 magazine tool data pot 115 (T4-digit)/pot 58 (T8-digit)
R11167		No.2 magazine tool data pot 108 (T4-digit)/ pot 54 (T8-digit)	R11175		No.2 magazine tool data pot 116 (T4-digit)/pot 58 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11176		No.2 magazine tool data pot 117 (T4-digit)/ pot 59 (T8-digit)	R11184		No.2 magazine tool data pot 63 (T8-digit)
R11177		No.2 magazine tool data pot 118 (T4-digit)/ pot 59 (T8-digit)	R11185		No.2 magazine tool data pot 63 (T8-digit)
R11178		No.2 magazine tool data pot 119 (T4-digit)/ pot 60 (T8-digit)	R11186		No.2 magazine tool data pot 64 (T8-digit)
R11179		No.2 magazine tool data pot 120 (T4-digit)/ pot 60 (T8-digit)	R11187		No.2 magazine tool data pot 64 (T8-digit)
R11180		No.2 magazine tool data pot 61 (T8-digit)	R11188		No.2 magazine tool data pot 65 (T8-digit)
R11181		No.2 magazine tool data pot 61 (T8-digit)	R11189		No.2 magazine tool data pot 65 (T8-digit)
R11182		No.2 magazine tool data pot 62 (T8-digit)	R11190		No.2 magazine tool data pot 66 (T8-digit)
R11183		No.2 magazine tool data pot 62 (T8-digit)	R11191		No.2 magazine tool data pot 66 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11192		No.2 magazine tool data pot 67 (T8-digit)	R11200		No.2 magazine tool data pot 71 (T8-digit)
R11193		No.2 magazine tool data pot 67 (T8-digit)	R11201		No.2 magazine tool data pot 71 (T8-digit)
R11194		No.2 magazine tool data pot 68 (T8-digit)	R11202		No.2 magazine tool data pot 72 (T8-digit)
R11195		No.2 magazine tool data pot 68 (T8-digit)	R11203		No.2 magazine tool data pot 72 (T8-digit)
R11196		No.2 magazine tool data pot 69 (T8-digit)	R11204		No.2 magazine tool data pot 73 (T8-digit)
R11197		No.2 magazine tool data pot 69 (T8-digit)	R11205		No.2 magazine tool data pot 73 (T8-digit)
R11198		No.2 magazine tool data pot 70 (T8-digit)	R11206		No.2 magazine tool data pot 74 (T8-digit)
R11199		No.2 magazine tool data pot 70 (T8-digit)	R11207		No.2 magazine tool data pot 74 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11208		No.2 magazine tool data pot 75 (T8-digit)	R11216		No.2 magazine tool data pot 79 (T8-digit)
R11209		No.2 magazine tool data pot 75 (T8-digit)	R11217		No.2 magazine tool data pot 79 (T8-digit)
R11210		No.2 magazine tool data pot 76 (T8-digit)	R11218		No.2 magazine tool data pot 80 (T8-digit)
R11211		No.2 magazine tool data pot 76 (T8-digit)	R11219		No.2 magazine tool data pot 80 (T8-digit)
R11212		No.2 magazine tool data pot 77 (T8-digit)	R11220		No.2 magazine tool data pot 81 (T8-digit)
R11213		No.2 magazine tool data pot 77 (T8-digit)	R11221		No.2 magazine tool data pot 81 (T8-digit)
R11214		No.2 magazine tool data pot 78 (T8-digit)	R11222		No.2 magazine tool data pot 82 (T8-digit)
R11215		No.2 magazine tool data pot 78 (T8-digit)	R11223		No.2 magazine tool data pot 82 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11224		No.2 magazine tool data pot 83 (T8-digit)	R11232		No.2 magazine tool data pot 87 (T8-digit)
R11225		No.2 magazine tool data pot 83 (T8-digit)	R11233		No.2 magazine tool data pot 87 (T8-digit)
R11226		No.2 magazine tool data pot 84 (T8-digit)	R11234		No.2 magazine tool data pot 88 (T8-digit)
R11227		No.2 magazine tool data pot 84 (T8-digit)	R11235		No.2 magazine tool data pot 88 (T8-digit)
R11228		No.2 magazine tool data pot 85 (T8-digit)	R11236		No.2 magazine tool data pot 89 (T8-digit)
R11229		No.2 magazine tool data pot 85 (T8-digit)	R11237		No.2 magazine tool data pot 89 (T8-digit)
R11230		No.2 magazine tool data pot 86 (T8-digit)	R11238		No.2 magazine tool data pot 90 (T8-digit)
R11231		No.2 magazine tool data pot 86 (T8-digit)	R11239		No.2 magazine tool data pot 90 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11240		No.2 magazine tool data pot 91 (T8-digit)	R11248		No.2 magazine tool data pot 95 (T8-digit)
R11241		No.2 magazine tool data pot 91 (T8-digit)	R11249		No.2 magazine tool data pot 95 (T8-digit)
R11242		No.2 magazine tool data pot 92 (T8-digit)	R11250		No.2 magazine tool data pot 96 (T8-digit)
R11243		No.2 magazine tool data pot 92 (T8-digit)	R11251		No.2 magazine tool data pot 96 (T8-digit)
R11244		No.2 magazine tool data pot 93 (T8-digit)	R11252		No.2 magazine tool data pot 97 (T8-digit)
R11245		No.2 magazine tool data pot 93 (T8-digit)	R11253		No.2 magazine tool data pot 97 (T8-digit)
R11246		No.2 magazine tool data pot 94 (T8-digit)	R11254		No.2 magazine tool data pot 98 (T8-digit)
R11247		No.2 magazine tool data pot 94 (T8-digit)	R11255		No.2 magazine tool data pot 98 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11256		No.2 magazine tool data pot 99 (T8-digit)	R11264		No.2 magazine tool data pot 103 (T8-digit)
R11257		No.2 magazine tool data pot 99 (T8-digit)	R11265		No.2 magazine tool data pot 103 (T8-digit)
R11258		No.2 magazine tool data pot 100 (T8-digit)	R11266		No.2 magazine tool data pot 104 (T8-digit)
R11259		No.2 magazine tool data pot 100 (T8-digit)	R11267		No.2 magazine tool data pot 104 (T8-digit)
R11260		No.2 magazine tool data pot 101 (T8-digit)	R11268		No.2 magazine tool data pot 105 (T8-digit)
R11261		No.2 magazine tool data pot 101 (T8-digit)	R11269		No.2 magazine tool data pot 105 (T8-digit)
R11262		No.2 magazine tool data pot 102 (T8-digit)	R11270		No.2 magazine tool data pot 106 (T8-digit)
R11263		No.2 magazine tool data pot 102 (T8-digit)	R11271		No.2 magazine tool data pot 106 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11272		No.2 magazine tool data pot 107 (T8-digit)	R11280		No.2 magazine tool data pot 111 (T8-digit)
R11273		No.2 magazine tool data pot 107 (T8-digit)	R11281		No.2 magazine tool data pot 111 (T8-digit)
R11274		No.2 magazine tool data pot 108 (T8-digit)	R11282		No.2 magazine tool data pot 112 (T8-digit)
R11275		No.2 magazine tool data pot 108 (T8-digit)	R11283		No.2 magazine tool data pot 112 (T8-digit)
R11276		No.2 magazine tool data pot 109 (T8-digit)	R11284		No.2 magazine tool data pot 113 (T8-digit)
R11277		No.2 magazine tool data pot 109 (T8-digit)	R11285		No.2 magazine tool data pot 113 (T8-digit)
R11278		No.2 magazine tool data pot 110 (T8-digit)	R11286		No.2 magazine tool data pot 114 (T8-digit)
R11279		No.2 magazine tool data pot 110 (T8-digit)	R11287		No.2 magazine tool data pot 114 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11288		No.2 magazine tool data pot 115 (T8-digit)	R11296		No.2 magazine tool data pot 119 (T8-digit)
R11289		No.2 magazine tool data pot 115 (T8-digit)	R11297		No.2 magazine tool data pot 119 (T8-digit)
R11290		No.2 magazine tool data pot 116 (T8-digit)	R11298		No.2 magazine tool data pot 120 (T8-digit)
R11291		No.2 magazine tool data pot 116 (T8-digit)	R11299		No.2 magazine tool data pot 120 (T8-digit)
R11292		No.2 magazine tool data pot 117 (T8-digit)	R11300		No.2 magazine tool data (Aux.D) pot 1
R11293		No.2 magazine tool data pot 117 (T8-digit)	R11301		No.2 magazine tool data (Aux.D) pot 2
R11294		No.2 magazine tool data pot 118 (T8-digit)	R11302		No.2 magazine tool data (Aux.D) pot 3
R11295		No.2 magazine tool data pot 118 (T8-digit)	R11303		No.2 magazine tool data (Aux.D) pot 4

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11304		No.2 magazine tool data (Aux.D) pot 5	R11312		No.2 magazine tool data (Aux.D) pot 13
R11305		No.2 magazine tool data (Aux.D) pot 6	R11313		No.2 magazine tool data (Aux.D) pot 14
R11306		No.2 magazine tool data (Aux.D) pot 7	R11314		No.2 magazine tool data (Aux.D) pot 15
R11307		No.2 magazine tool data (Aux.D) pot 8	R11315		No.2 magazine tool data (Aux.D) pot 16
R11308		No.2 magazine tool data (Aux.D) pot 9	R11316		No.2 magazine tool data (Aux.D) pot 17
R11309		No.2 magazine tool data (Aux.D) pot 10	R11317		No.2 magazine tool data (Aux.D) pot 18
R11310		No.2 magazine tool data (Aux.D) pot 11	R11318		No.2 magazine tool data (Aux.D) pot 19
R11311		No.2 magazine tool data (Aux.D) pot 12	R11319		No.2 magazine tool data (Aux.D) pot 20

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11320		No.2 magazine tool data (Aux.D) pot 21	R11328		No.2 magazine tool data (Aux.D) pot 29
R11321		No.2 magazine tool data (Aux.D) pot 22	R11329		No.2 magazine tool data (Aux.D) pot 30
R11322		No.2 magazine tool data (Aux.D) pot 23	R11330		No.2 magazine tool data (Aux.D) pot 31
R11323		No.2 magazine tool data (Aux.D) pot 24	R11331		No.2 magazine tool data (Aux.D) pot 32
R11324		No.2 magazine tool data (Aux.D) pot 25	R11332		No.2 magazine tool data (Aux.D) pot 33
R11325		No.2 magazine tool data (Aux.D) pot 26	R11333		No.2 magazine tool data (Aux.D) pot 34
R11326		No.2 magazine tool data (Aux.D) pot 27	R11334		No.2 magazine tool data (Aux.D) pot 35
R11327		No.2 magazine tool data (Aux.D) pot 28	R11335		No.2 magazine tool data (Aux.D) pot 36

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11336		No.2 magazine tool data (Aux.D) pot 37	R11344		No.2 magazine tool data (Aux.D) pot 45
R11337		No.2 magazine tool data (Aux.D) pot 38	R11345		No.2 magazine tool data (Aux.D) pot 46
R11338		No.2 magazine tool data (Aux.D) pot 39	R11346		No.2 magazine tool data (Aux.D) pot 47
R11339		No.2 magazine tool data (Aux.D) pot 40	R11347		No.2 magazine tool data (Aux.D) pot 48
R11340		No.2 magazine tool data (Aux.D) pot 41	R11348		No.2 magazine tool data (Aux.D) pot 49
R11341		No.2 magazine tool data (Aux.D) pot 42	R11349		No.2 magazine tool data (Aux.D) pot 50
R11342		No.2 magazine tool data (Aux.D) pot 43	R11350		No.2 magazine tool data (Aux.D) pot 51
R11343		No.2 magazine tool data (Aux.D) pot 44	R11351		No.2 magazine tool data (Aux.D) pot 52

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11352		No.2 magazine tool data (Aux.D) pot 53	R11360		No.2 magazine tool data (Aux.D) pot 61
R11353		No.2 magazine tool data (Aux.D) pot 54	R11361		No.2 magazine tool data (Aux.D) pot 62
R11354		No.2 magazine tool data (Aux.D) pot 55	R11362		No.2 magazine tool data (Aux.D) pot 63
R11355		No.2 magazine tool data (Aux.D) pot 56	R11363		No.2 magazine tool data (Aux.D) pot 64
R11356		No.2 magazine tool data (Aux.D) pot 57	R11364		No.2 magazine tool data (Aux.D) pot 65
R11357		No.2 magazine tool data (Aux.D) pot 58	R11365		No.2 magazine tool data (Aux.D) pot 66
R11358		No.2 magazine tool data (Aux.D) pot 59	R11366		No.2 magazine tool data (Aux.D) pot 67
R11359		No.2 magazine tool data (Aux.D) pot 60	R11367		No.2 magazine tool data (Aux.D) pot 68

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11368		No.2 magazine tool data (Aux.D) pot 69	R11376		No.2 magazine tool data (Aux.D) pot 77
R11369		No.2 magazine tool data (Aux.D) pot 70	R11377		No.2 magazine tool data (Aux.D) pot 78
R11370		No.2 magazine tool data (Aux.D) pot 71	R11378		No.2 magazine tool data (Aux.D) pot 79
R11371		No.2 magazine tool data (Aux.D) pot 72	R11379		No.2 magazine tool data (Aux.D) pot 80
R11372		No.2 magazine tool data (Aux.D) pot 73	R11380		No.2 magazine tool data (Aux.D) pot 81
R11373		No.2 magazine tool data (Aux.D) pot 74	R11381		No.2 magazine tool data (Aux.D) pot 82
R11374		No.2 magazine tool data (Aux.D) pot 75	R11382		No.2 magazine tool data (Aux.D) pot 83
R11375		No.2 magazine tool data (Aux.D) pot 76	R11383		No.2 magazine tool data (Aux.D) pot 84

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11384		No.2 magazine tool data (Aux.D) pot 85	R11392		No.2 magazine tool data (Aux.D) pot 93
R11385		No.2 magazine tool data (Aux.D) pot 86	R11393		No.2 magazine tool data (Aux.D) pot 94
R11386		No.2 magazine tool data (Aux.D) pot 87	R11394		No.2 magazine tool data (Aux.D) pot 95
R11387		No.2 magazine tool data (Aux.D) pot 88	R11395		No.2 magazine tool data (Aux.D) pot 96
R11388		No.2 magazine tool data (Aux.D) pot 89	R11396		No.2 magazine tool data (Aux.D) pot 97
R11389		No.2 magazine tool data (Aux.D) pot 90	R11397		No.2 magazine tool data (Aux.D) pot 98
R11390		No.2 magazine tool data (Aux.D) pot 91	R11398		No.2 magazine tool data (Aux.D) pot 99
R11391		No.2 magazine tool data (Aux.D) pot 92	R11399		No.2 magazine tool data (Aux.D) pot 100

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11400		No.2 magazine tool data (Aux.D) pot 101	R11408		No.2 magazine tool data (Aux.D) pot 109
R11401		No.2 magazine tool data (Aux.D) pot 102	R11409		No.2 magazine tool data (Aux.D) pot 110
R11402		No.2 magazine tool data (Aux.D) pot 103	R11410		No.2 magazine tool data (Aux.D) pot 111
R11403		No.2 magazine tool data (Aux.D) pot 104	R11411		No.2 magazine tool data (Aux.D) pot 112
R11404		No.2 magazine tool data (Aux.D) pot 105	R11412		No.2 magazine tool data (Aux.D) pot 113
R11405		No.2 magazine tool data (Aux.D) pot 106	R11413		No.2 magazine tool data (Aux.D) pot 114
R11406		No.2 magazine tool data (Aux.D) pot 107	R11414		No.2 magazine tool data (Aux.D) pot 115
R11407		No.2 magazine tool data (Aux.D) pot 108	R11415		No.2 magazine tool data (Aux.D) pot 116

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11416		No.2 magazine tool data (Aux.D) pot 117	R11424		No.3 magazine tool data pot 5 (T4-digit)/pot 3 (T8-digit)
R11417		No.2 magazine tool data (Aux.D) pot 118	R11425		No.3 magazine tool data pot 6 (T4-digit)/pot 3 (T8-digit)
R11418		No.2 magazine tool data (Aux.D) pot 119	R11426		No.3 magazine tool data pot 7 (T4-digit)/pot 4 (T8-digit)
R11419		No.2 magazine tool data (Aux.D) pot 120	R11427		No.3 magazine tool data pot 8 (T4-digit)/pot 4 (T8-digit)
R11420		No.3 magazine tool data pot 1	R11428		No.3 magazine tool data pot 9 (T4-digit)/pot 5 (T8-digit)
R11421		No.3 magazine tool data pot 2 (T4-digit)/ pot 1 (T8-digit)	R11429		No.3 magazine tool data pot 10 (T4-digit)/pot 5 (T8-digit)
R11422		No.3 magazine tool data pot 3 (T4-digit)/ pot 2 (T8-digit)	R11430		No.3 magazine tool data pot 11 (T4-digit)/pot 6 (T8-digit)
R11423		No.3 magazine tool data pot 3 (T4-digit)/ pot 2 (T8-digit)	R11431		No.3 magazine tool data pot 12 (T4-digit)/pot 6 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11432		No.3 magazine tool data pot 13 (T4-digit)/ pot 7 (T8-digit)	R11440		No.3 magazine tool data pot 21 (T4-digit)/pot 11 (T8-digit)
R11433		No.3 magazine tool data pot 14 (T4-digit)/ pot 7 (T8-digit)	R11441		No.3 magazine tool data pot 22 (T4-digit)/pot 11 (T8-digit)
R11434		No.3 magazine tool data pot 15 (T4-digit)/ pot 8 (T8-digit)	R11442		No.3 magazine tool data pot 23 (T4-digit)/pot 12 (T8-digit)
R11435		No.3 magazine tool data pot 16 (T4-digit)/ pot 8 (T8-digit)	R11443		No.3 magazine tool data pot 24 (T4-digit)/pot 12 (T8-digit)
R11436		No.3 magazine tool data pot 17 (T4-digit)/ pot 9 (T8-digit)	R11444		No.3 magazine tool data pot 25 (T4-digit)/pot 13 (T8-digit)
R11437		No.3 magazine tool data pot 18 (T4-digit)/ pot 9 (T8-digit)	R11445		No.3 magazine tool data pot 26 (T4-digit)/pot 13 (T8-digit)
R11438		No.3 magazine tool data pot 19 (T4-digit)/ pot 10 (T8-digit)	R11446		No.3 magazine tool data pot 27 (T4-digit)/pot 14 (T8-digit)
R11439		No.3 magazine tool data pot 20 (T4-digit)/ pot 10 (T8-digit)	R11447		No.3 magazine tool data pot 28 (T4-digit)/pot 14 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11448		No.3 magazine tool data pot 29 (T4-digit)/ pot 15 (T8-digit)	R11456		No.3 magazine tool data pot 37 (T4-digit)/pot 19 (T8-digit)
R11449		No.3 magazine tool data pot 30 (T4-digit)/ pot 15 (T8-digit)	R11457		No.3 magazine tool data pot 38 (T4-digit)/pot 19 (T8-digit)
R11450		No.3 magazine tool data pot 31 (T4-digit)/ pot 16 (T8-digit)	R11458		No.3 magazine tool data pot 39 (T4-digit)/pot 20 (T8-digit)
R11451		No.3 magazine tool data pot 32 (T4-digit)/ pot 16 (T8-digit)	R11459		No.3 magazine tool data pot 40 (T4-digit)/pot 20 (T8-digit)
R11452		No.3 magazine tool data pot 33 (T4-digit)/ pot 17 (T8-digit)	R11460		No.3 magazine tool data pot 41 (T4-digit)/pot 21 (T8-digit)
R11453		No.3 magazine tool data pot 34 (T4-digit)/ pot 17 (T8-digit)	R11461		No.3 magazine tool data pot 42 (T4-digit)/pot 21 (T8-digit)
R11454		No.3 magazine tool data pot 35 (T4-digit)/ pot 18 (T8-digit)	R11462		No.3 magazine tool data pot 43 (T4-digit)/pot 22 (T8-digit)
R11455		No.3 magazine tool data pot 36 (T4-digit)/ pot 18 (T8-digit)	R11463		No.3 magazine tool data pot 44 (T4-digit)/pot 22 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11464		No.3 magazine tool data pot 45 (T4-digit)/ pot 23 (T8-digit)	R11472		No.3 magazine tool data pot 53 (T4-digit)/pot 27 (T8-digit)
R11465		No.3 magazine tool data pot 46 (T4-digit)/ pot 23 (T8-digit)	R11473		No.3 magazine tool data pot 54 (T4-digit)/pot 27 (T8-digit)
R11466		No.3 magazine tool data pot 47 (T4-digit)/ pot 24 (T8-digit)	R11474		No.3 magazine tool data pot 55 (T4-digit)/pot 28 (T8-digit)
R11467		No.3 magazine tool data pot 48 (T4-digit)/ pot 24 (T8-digit)	R11475		No.3 magazine tool data pot 56 (T4-digit)/pot 28 (T8-digit)
R11468		No.3 magazine tool data pot 49 (T4-digit)/ pot 25 (T8-digit)	R11476		No.3 magazine tool data pot 57 (T4-digit)/pot 29 (T8-digit)
R11469		No.3 magazine tool data pot 50 (T4-digit)/ pot 25 (T8-digit)	R11477		No.3 magazine tool data pot 58 (T4-digit)/pot 29 (T8-digit)
R11470		No.3 magazine tool data pot 51 (T4-digit)/ pot 26 (T8-digit)	R11478		No.3 magazine tool data pot 59 (T4-digit)/pot 30 (T8-digit)
R11471		No.3 magazine tool data pot 52 (T4-digit)/ pot 26 (T8-digit)	R11479		No.3 magazine tool data pot 60 (T4-digit)/pot 30 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11480		No.3 magazine tool data pot 61 (T4-digit)/ pot 31 (T8-digit)	R11488		No.3 magazine tool data pot 69 (T4-digit)/pot 35 (T8-digit)
R11481		No.3 magazine tool data pot 62 (T4-digit)/ pot 31 (T8-digit)	R11489		No.3 magazine tool data pot 70 (T4-digit)/pot 35 (T8-digit)
R11482		No.3 magazine tool data pot 63 (T4-digit)/ pot 32 (T8-digit)	R11490		No.3 magazine tool data pot 71 (T4-digit)/pot 36 (T8-digit)
R11483		No.3 magazine tool data pot 64 (T4-digit)/ pot 32 (T8-digit)	R11491		No.3 magazine tool data pot 72 (T4-digit)/pot 36 (T8-digit)
R11484		No.3 magazine tool data pot 65 (T4-digit)/ pot 33 (T8-digit)	R11492		No.3 magazine tool data pot 73 (T4-digit)/pot 37 (T8-digit)
R11485		No.3 magazine tool data pot 66 (T4-digit)/ pot 33 (T8-digit)	R11493		No.3 magazine tool data pot 74 (T4-digit)/pot 37 (T8-digit)
R11486		No.3 magazine tool data pot 67 (T4-digit)/ pot 34 (T8-digit)	R11494		No.3 magazine tool data pot 75 (T4-digit)/pot 38 (T8-digit)
R11487		No.3 magazine tool data pot 68 (T4-digit)/ pot 34 (T8-digit)	R11495		No.3 magazine tool data pot 76 (T4-digit)/pot 38 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11496		No.3 magazine tool data pot 77 (T4-digit)/ pot 39 (T8-digit)	R11504		No.3 magazine tool data pot 85 (T4-digit)/pot 43 (T8-digit)
R11497		No.3 magazine tool data pot 78 (T4-digit)/ pot 39 (T8-digit)	R11505		No.3 magazine tool data pot 86 (T4-digit)/pot 43 (T8-digit)
R11498		No.3 magazine tool data pot 79 (T4-digit)/ pot 40 (T8-digit)	R11506		No.3 magazine tool data pot 87 (T4-digit)/pot 44 (T8-digit)
R11499		No.3 magazine tool data pot 80 (T4-digit)/ pot 40 (T8-digit)	R11507		No.3 magazine tool data pot 88 (T4-digit)/pot 44 (T8-digit)
R11500		No.3 magazine tool data pot 81 (T4-digit)/ pot 41 (T8-digit)	R11508		No.3 magazine tool data pot 89 (T4-digit)/pot 45 (T8-digit)
R11501		No.3 magazine tool data pot 82 (T4-digit)/ pot 41 (T8-digit)	R11509		No.3 magazine tool data pot 90 (T4-digit)/pot 45 (T8-digit)
R11502		No.3 magazine tool data pot 83 (T4-digit)/ pot 42 (T8-digit)	R11510		No.3 magazine tool data pot 91 (T4-digit)/pot 46 (T8-digit)
R11503		No.3 magazine tool data pot 84 (T4-digit)/ pot 42 (T8-digit)	R11511		No.3 magazine tool data pot 92 (T4-digit)/pot 46 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11512		No.3 magazine tool data pot 93 (T4-digit)/ pot 47 (T8-digit)	R11520		No.3 magazine tool data pot 101 (T4-digit)/pot 51 (T8-digit)
R11513		No.3 magazine tool data pot 94 (T4-digit)/ pot 47 (T8-digit)	R11521		No.3 magazine tool data pot 102 (T4-digit)/pot 51 (T8-digit)
R11514		No.3 magazine tool data pot 95 (T4-digit)/ pot 48 (T8-digit)	R11522		No.3 magazine tool data pot 103 (T4-digit)/pot 52 (T8-digit)
R11515		No.3 magazine tool data pot 96 (T4-digit)/ pot 48 (T8-digit)	R11523		No.3 magazine tool data pot 104 (T4-digit)/pot 52 (T8-digit)
R11516		No.3 magazine tool data pot 97 (T4-digit)/ pot 49 (T8-digit)	R11524		No.3 magazine tool data pot 105 (T4-digit)/pot 53 (T8-digit)
R11517		No.3 magazine tool data pot 98 (T4-digit)/ pot 49 (T8-digit)	R11525		No.3 magazine tool data pot 106 (T4-digit)/pot 53 (T8-digit)
R11518		No.3 magazine tool data pot 99 (T4-digit)/ pot 50 (T8-digit)	R11526		No.3 magazine tool data pot 107 (T4-digit)/pot 54 (T8-digit)
R11519		No.3 magazine tool data pot 100 (T4-digit)/ pot 50 (T8-digit)	R11527		No.3 magazine tool data pot 108 (T4-digit)/pot 54 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11528		No.3 magazine tool data pot 109 (T4-digit)/ pot 55 (T8-digit)	R11536		No.3 magazine tool data pot 117 (T4-digit)/pot 59 (T8-digit)
R11529		No.3 magazine tool data pot 110 (T4-digit)/ pot 55 (T8-digit)	R11537		No.3 magazine tool data pot 118 (T4-digit)/pot 59 (T8-digit)
R11530		No.3 magazine tool data pot 111 (T4-digit)/ pot 56 (T8-digit)	R11538		No.3 magazine tool data pot 119 (T4-digit)/pot 60 (T8-digit)
R11531		No.3 magazine tool data pot 112 (T4-digit)/ pot 56 (T8-digit)	R11539		No.3 magazine tool data pot 120 (T4-digit)/pot 60 (T8-digit)
R11532		No.3 magazine tool data pot 113 (T4-digit)/ pot 57 (T8-digit)	R11540		No.3 magazine tool data pot 61 (T8-digit)
R11533		No.3 magazine tool data pot 114 (T4-digit)/ pot 57 (T8-digit)	R11541		No.3 magazine tool data pot 61 (T8-digit)
R11534		No.3 magazine tool data pot 115 (T4-digit)/ pot 58 (T8-digit)	R11542		No.3 magazine tool data pot 62 (T8-digit)
R11535		No.3 magazine tool data pot 116 (T4-digit)/ pot 58 (T8-digit)	R11543		No.3 magazine tool data pot 62 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11544		No.3 magazine tool data pot 63 (T8-digit)	R11552		No.3 magazine tool data pot 67 (T8-digit)
R11545		No.3 magazine tool data pot 63 (T8-digit)	R11553		No.3 magazine tool data pot 67 (T8-digit)
R11546		No.3 magazine tool data pot 64 (T8-digit)	R11554		No.3 magazine tool data pot 68 (T8-digit)
R11547		No.3 magazine tool data pot 64 (T8-digit)	R11555		No.3 magazine tool data pot 68 (T8-digit)
R11548		No.3 magazine tool data pot 65 (T8-digit)	R11556		No.3 magazine tool data pot 69 (T8-digit)
R11549		No.3 magazine tool data pot 65 (T8-digit)	R11557		No.3 magazine tool data pot 69 (T8-digit)
R11550		No.3 magazine tool data pot 66 (T8-digit)	R11558		No.3 magazine tool data pot 70 (T8-digit)
R11551		No.3 magazine tool data pot 66 (T8-digit)	R11559		No.3 magazine tool data pot 70 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11560		No.3 magazine tool data pot 71 (T8-digit)	R11568		No.3 magazine tool data pot 75 (T8-digit)
R11561		No.3 magazine tool data pot 71 (T8-digit)	R11569		No.3 magazine tool data pot 75 (T8-digit)
R11562		No.3 magazine tool data pot 72 (T8-digit)	R11570		No.3 magazine tool data pot 76 (T8-digit)
R11563		No.3 magazine tool data pot 72 (T8-digit)	R11571		No.3 magazine tool data pot 76 (T8-digit)
R11564		No.3 magazine tool data pot 73 (T8-digit)	R11572		No.3 magazine tool data pot 77 (T8-digit)
R11565		No.3 magazine tool data pot 73 (T8-digit)	R11573		No.3 magazine tool data pot 77 (T8-digit)
R11566		No.3 magazine tool data pot 74 (T8-digit)	R11574		No.3 magazine tool data pot 78 (T8-digit)
R11567		No.3 magazine tool data pot 74 (T8-digit)	R11575		No.3 magazine tool data pot 78 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11576		No.3 magazine tool data pot 79 (T8-digit)	R11584		No.3 magazine tool data pot 83 (T8-digit)
R11577		No.3 magazine tool data pot 79 (T8-digit)	R11585		No.3 magazine tool data pot 83 (T8-digit)
R11578		No.3 magazine tool data pot 80 (T8-digit)	R11586		No.3 magazine tool data pot 84 (T8-digit)
R11579		No.3 magazine tool data pot 80 (T8-digit)	R11587		No.3 magazine tool data pot 84 (T8-digit)
R11580		No.3 magazine tool data pot 81 (T8-digit)	R11588		No.3 magazine tool data pot 85 (T8-digit)
R11581		No.3 magazine tool data pot 81 (T8-digit)	R11589		No.3 magazine tool data pot 85 (T8-digit)
R11582		No.3 magazine tool data pot 82 (T8-digit)	R11590		No.3 magazine tool data pot 86 (T8-digit)
R11583		No.3 magazine tool data pot 82 (T8-digit)	R11591		No.3 magazine tool data pot 86 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11592		No.3 magazine tool data pot 87 (T8-digit)	R11600		No.3 magazine tool data pot 91 (T8-digit)
R11593		No.3 magazine tool data pot 87 (T8-digit)	R11601		No.3 magazine tool data pot 91 (T8-digit)
R11594		No.3 magazine tool data pot 88 (T8-digit)	R11602		No.3 magazine tool data pot 92 (T8-digit)
R11595		No.3 magazine tool data pot 88 (T8-digit)	R11603		No.3 magazine tool data pot 92 (T8-digit)
R11596		No.3 magazine tool data pot 89 (T8-digit)	R11604		No.3 magazine tool data pot 93 (T8-digit)
R11597		No.3 magazine tool data pot 89 (T8-digit)	R11605		No.3 magazine tool data pot 93 (T8-digit)
R11598		No.3 magazine tool data pot 90 (T8-digit)	R11606		No.3 magazine tool data pot 94 (T8-digit)
R11599		No.3 magazine tool data pot 90 (T8-digit)	R11607		No.3 magazine tool data pot 94 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11608		No.3 magazine tool data pot 95 (T8-digit)	R11616		No.3 magazine tool data pot 99 (T8-digit)
R11609		No.3 magazine tool data pot 95 (T8-digit)	R11617		No.3 magazine tool data pot 99 (T8-digit)
R11610		No.3 magazine tool data pot 96 (T8-digit)	R11618		No.3 magazine tool data pot 100 (T8-digit)
R11611		No.3 magazine tool data pot 96 (T8-digit)	R11619		No.3 magazine tool data pot 100 (T8-digit)
R11612		No.3 magazine tool data pot 97 (T8-digit)	R11620		No.3 magazine tool data pot 101 (T8-digit)
R11613		No.3 magazine tool data pot 97 (T8-digit)	R11621		No.3 magazine tool data pot 101 (T8-digit)
R11614		No.3 magazine tool data pot 98 (T8-digit)	R11622		No.3 magazine tool data pot 102 (T8-digit)
R11615		No.3 magazine tool data pot 98 (T8-digit)	R11623		No.3 magazine tool data pot 102 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11624		No.3 magazine tool data pot 103 (T8-digit)	R11632		No.3 magazine tool data pot 107 (T8-digit)
R11625		No.3 magazine tool data pot 103 (T8-digit)	R11633		No.3 magazine tool data pot 107 (T8-digit)
R11626		No.3 magazine tool data pot 104 (T8-digit)	R11634		No.3 magazine tool data pot 108 (T8-digit)
R11627		No.3 magazine tool data pot 104 (T8-digit)	R11635		No.3 magazine tool data pot 108 (T8-digit)
R11628		No.3 magazine tool data pot 105 (T8-digit)	R11636		No.3 magazine tool data pot 109 (T8-digit)
R11629		No.3 magazine tool data pot 105 (T8-digit)	R11637		No.3 magazine tool data pot 109 (T8-digit)
R11630		No.3 magazine tool data pot 106 (T8-digit)	R11638		No.3 magazine tool data pot 110 (T8-digit)
R11631		No.3 magazine tool data pot 106 (T8-digit)	R11639		No.3 magazine tool data pot 110 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11640		No.3 magazine tool data pot 111 (T8-digit)	R11648		No.3 magazine tool data pot 115 (T8-digit)
R11641		No.3 magazine tool data pot 111 (T8-digit)	R11649		No.3 magazine tool data pot 115 (T8-digit)
R11642		No.3 magazine tool data pot 112 (T8-digit)	R11650		No.3 magazine tool data pot 116 (T8-digit)
R11643		No.3 magazine tool data pot 112 (T8-digit)	R11651		No.3 magazine tool data pot 116 (T8-digit)
R11644		No.3 magazine tool data pot 113 (T8-digit)	R11652		No.3 magazine tool data pot 117 (T8-digit)
R11645		No.3 magazine tool data pot 113 (T8-digit)	R11653		No.3 magazine tool data pot 117 (T8-digit)
R11646		No.3 magazine tool data pot 114 (T8-digit)	R11654		No.3 magazine tool data pot 118 (T8-digit)
R11647		No.3 magazine tool data pot 114 (T8-digit)	R11655		No.3 magazine tool data pot 118 (T8-digit)

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11656		No.3 magazine tool data pot 119 (T8-digit)	R11664		No.3 magazine tool data (Aux.D) pot 5
R11657		No.3 magazine tool data pot 119 (T8-digit)	R11665		No.3 magazine tool data (Aux.D) pot 6
R11658		No.3 magazine tool data pot 120 (T8-digit)	R11666		No.3 magazine tool data (Aux.D) pot 7
R11659		No.3 magazine tool data pot 120 (T8-digit)	R11667		No.3 magazine tool data (Aux.D) pot 8
R11660		No.3 magazine tool data (Aux.D) pot 1	R11668		No.3 magazine tool data (Aux.D) pot 9
R11661		No.3 magazine tool data (Aux.D) pot 2	R11669		No.3 magazine tool data (Aux.D) pot 10
R11662		No.3 magazine tool data (Aux.D) pot 3	R11670		No.3 magazine tool data (Aux.D) pot 11
R11663		No.3 magazine tool data (Aux.D) pot 4	R11671		No.3 magazine tool data (Aux.D) pot 12

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11672		No.3 magazine tool data (Aux.D) pot 13	R11680		No.3 magazine tool data (Aux.D) pot 21
R11673		No.3 magazine tool data (Aux.D) pot 14	R11681		No.3 magazine tool data (Aux.D) pot 22
R11674		No.3 magazine tool data (Aux.D) pot 15	R11682		No.3 magazine tool data (Aux.D) pot 23
R11675		No.3 magazine tool data (Aux.D) pot 16	R11683		No.3 magazine tool data (Aux.D) pot 24
R11676		No.3 magazine tool data (Aux.D) pot 17	R11684		No.3 magazine tool data (Aux.D) pot 25
R11677		No.3 magazine tool data (Aux.D) pot 18	R11685		No.3 magazine tool data (Aux.D) pot 26
R11678		No.3 magazine tool data (Aux.D) pot 19	R11686		No.3 magazine tool data (Aux.D) pot 27
R11679		No.3 magazine tool data (Aux.D) pot 20	R11687		No.3 magazine tool data (Aux.D) pot 28

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11688		No.3 magazine tool data (Aux.D) pot 29	R11696		No.3 magazine tool data (Aux.D) pot 37
R11689		No.3 magazine tool data (Aux.D) pot 30	R11697		No.3 magazine tool data (Aux.D) pot 38
R11690		No.3 magazine tool data (Aux.D) pot 31	R11698		No.3 magazine tool data (Aux.D) pot 39
R11691		No.3 magazine tool data (Aux.D) pot 32	R11699		No.3 magazine tool data (Aux.D) pot 40
R11692		No.3 magazine tool data (Aux.D) pot 33	R11700		No.3 magazine tool data (Aux.D) pot 41
R11693		No.3 magazine tool data (Aux.D) pot 34	R11701		No.3 magazine tool data (Aux.D) pot 42
R11694		No.3 magazine tool data (Aux.D) pot 35	R11702		No.3 magazine tool data (Aux.D) pot 43
R11695		No.3 magazine tool data (Aux.D) pot 36	R11703		No.3 magazine tool data (Aux.D) pot 44

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11704		No.3 magazine tool data (Aux.D) pot 45	R11712		No.3 magazine tool data (Aux.D) pot 53
R11705		No.3 magazine tool data (Aux.D) pot 46	R11713		No.3 magazine tool data (Aux.D) pot 54
R11706		No.3 magazine tool data (Aux.D) pot 47	R11714		No.3 magazine tool data (Aux.D) pot 55
R11707		No.3 magazine tool data (Aux.D) pot 48	R11715		No.3 magazine tool data (Aux.D) pot 56
R11708		No.3 magazine tool data (Aux.D) pot 49	R11716		No.3 magazine tool data (Aux.D) pot 57
R11709		No.3 magazine tool data (Aux.D) pot 50	R11717		No.3 magazine tool data (Aux.D) pot 58
R11710		No.3 magazine tool data (Aux.D) pot 51	R11718		No.3 magazine tool data (Aux.D) pot 59
R11711		No.3 magazine tool data (Aux.D) pot 52	R11719		No.3 magazine tool data (Aux.D) pot 60

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11720		No.3 magazine tool data (Aux.D) pot 61	R11728		No.3 magazine tool data (Aux.D) pot 69
R11721		No.3 magazine tool data (Aux.D) pot 62	R11729		No.3 magazine tool data (Aux.D) pot 70
R11722		No.3 magazine tool data (Aux.D) pot 63	R11730		No.3 magazine tool data (Aux.D) pot 71
R11723		No.3 magazine tool data (Aux.D) pot 64	R11731		No.3 magazine tool data (Aux.D) pot 72
R11724		No.3 magazine tool data (Aux.D) pot 65	R11732		No.3 magazine tool data (Aux.D) pot 73
R11725		No.3 magazine tool data (Aux.D) pot 66	R11733		No.3 magazine tool data (Aux.D) pot 74
R11726		No.3 magazine tool data (Aux.D) pot 67	R11734		No.3 magazine tool data (Aux.D) pot 75
R11727		No.3 magazine tool data (Aux.D) pot 68	R11735		No.3 magazine tool data (Aux.D) pot 76

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11736		No.3 magazine tool data (Aux.D) pot 77	R11744		No.3 magazine tool data (Aux.D) pot 85
R11737		No.3 magazine tool data (Aux.D) pot 78	R11745		No.3 magazine tool data (Aux.D) pot 86
R11738		No.3 magazine tool data (Aux.D) pot 79	R11746		No.3 magazine tool data (Aux.D) pot 87
R11739		No.3 magazine tool data (Aux.D) pot 80	R11747		No.3 magazine tool data (Aux.D) pot 88
R11740		No.3 magazine tool data (Aux.D) pot 81	R11748		No.3 magazine tool data (Aux.D) pot 89
R11741		No.3 magazine tool data (Aux.D) pot 82	R11749		No.3 magazine tool data (Aux.D) pot 90
R11742		No.3 magazine tool data (Aux.D) pot 83	R11750		No.3 magazine tool data (Aux.D) pot 91
R11743		No.3 magazine tool data (Aux.D) pot 84	R11751		No.3 magazine tool data (Aux.D) pot 92

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11752		No.3 magazine tool data (Aux.D) pot 93	R11760		No.3 magazine tool data (Aux.D) pot 101
R11753		No.3 magazine tool data (Aux.D) pot 94	R11761		No.3 magazine tool data (Aux.D) pot 102
R11754		No.3 magazine tool data (Aux.D) pot 95	R11762		No.3 magazine tool data (Aux.D) pot 103
R11755		No.3 magazine tool data (Aux.D) pot 96	R11763		No.3 magazine tool data (Aux.D) pot 104
R11756		No.3 magazine tool data (Aux.D) pot 97	R11764		No.3 magazine tool data (Aux.D) pot 105
R11757		No.3 magazine tool data (Aux.D) pot 98	R11765		No.3 magazine tool data (Aux.D) pot 106
R11758		No.3 magazine tool data (Aux.D) pot 99	R11766		No.3 magazine tool data (Aux.D) pot 107
R11759		No.3 magazine tool data (Aux.D) pot 100	R11767		No.3 magazine tool data (Aux.D) pot 108

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R11768		No.3 magazine tool data (Aux.D) pot 109	R11776		No.3 magazine tool data (Aux.D) pot 117
R11769		No.3 magazine tool data (Aux.D) pot 110	R11777		No.3 magazine tool data (Aux.D) pot 118
R11770		No.3 magazine tool data (Aux.D) pot 111	R11778		No.3 magazine tool data (Aux.D) pot 119
R11771		No.3 magazine tool data (Aux.D) pot 112	R11779		No.3 magazine tool data (Aux.D) pot 120
R11772		No.3 magazine tool data (Aux.D) pot 113	R11780		
R11773		No.3 magazine tool data (Aux.D) pot 114	R11781		
R11774		No.3 magazine tool data (Aux.D) pot 115	R11782		
R11775		No.3 magazine tool data (Aux.D) pot 116	R11783		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14700	R14950	R15200	R15450	R15700	R15950	R16200	R16450		MES interface library: Machining start time
R14701	R14951	R15201	R15451	R15701	R15951	R16201	R16451		
R14702	R14952	R15202	R15452	R15702	R15952	R16202	R16452		MES interface library: Machining end time
R14703	R14953	R15203	R15453	R15703	R15953	R16203	R16453		
R14704	R14954	R15204	R15454	R15704	R15954	R16204	R16454		MES interface library: Program (O) number at machining start
R14705	R14955	R15205	R15455	R15705	R15955	R16205	R16455		
R14706	R14956	R15206	R15456	R15706	R15956	R16206	R16456		
R14707	R14957	R15207	R15457	R15707	R15957	R16207	R16457		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14708	R14958	R15208	R15458	R15708	R15958	R16208	R16458		MES interface library: Program (O) number at machining start
R14709	R14959	R15209	R15459	R15709	R15959	R16209	R16459		
R14710	R14960	R15210	R15460	R15710	R15960	R16210	R16460		
R14711	R14961	R15211	R15461	R15711	R15961	R16211	R16461		
R14712	R14962	R15212	R15462	R15712	R15962	R16212	R16462		
R14713	R14963	R15213	R15463	R15713	R15963	R16213	R16463		
R14714	R14964	R15214	R15464	R15714	R15964	R16214	R16464		
R14715	R14965	R15215	R15465	R15715	R15965	R16215	R16465		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14716	R14966	R15216	R15466	R15716	R15966	R16216	R16466		MES interface library: Program (O) number at machining start
R14717	R14967	R15217	R15467	R15717	R15967	R16217	R16467		
R14718	R14968	R15218	R15468	R15718	R15968	R16218	R16468		
R14719	R14969	R15219	R15469	R15719	R15969	R16219	R16469		
R14720	R14970	R15220	R15470	R15720	R15970	R16220	R16470		MES interface library: N number at machining start
R14721	R14971	R15221	R15471	R15721	R15971	R16221	R16471		
R14722	R14972	R15222	R15472	R15722	R15972	R16222	R16472		MES interface library: B number at machining start
R14723	R14973	R15223	R15473	R15723	R15973	R16223	R16473		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14724	R14974	R15224	R15474	R15724	R15974	R16224	R16474		MES interface library: Spindle 1 maximum load
R14725	R14975	R15225	R15475	R15725	R15975	R16225	R16475		MES interface library: Spindle 2 maximum load
R14726	R14976	R15226	R15476	R15726	R15976	R16226	R16476		MES interface library: Power consumption value
R14727	R14977	R15227	R15477	R15727	R15977	R16227	R16477		
R14728	R14978	R15228	R15478	R15728	R15978	R16228	R16478		MES interface library: Power regeneration value
R14729	R14979	R15229	R15479	R15729	R15979	R16229	R16479		
R14730	R14980	R15230	R15480	R15730	R15980	R16230	R16480		MES interface library: Number of machined workpieces
R14731	R14981	R15231	R15481	R15731	R15981	R16231	R16481		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14732	R14982	R15232	R15482	R15732	R15982	R16232	R16482		MES interface library: Tool number 1
R14733	R14983	R15233	R15483	R15733	R15983	R16233	R16483		MES interface library: Tool number 2
R14734	R14984	R15234	R15484	R15734	R15984	R16234	R16484		MES interface library: Tool number 3
R14735	R14985	R15235	R15485	R15735	R15985	R16235	R16485		MES interface library: Tool number 4
R14736	R14986	R15236	R15486	R15736	R15986	R16236	R16486		MES interface library: Tool number 5
R14737	R14987	R15237	R15487	R15737	R15987	R16237	R16487		MES interface library: Tool offset number 1
R14738	R14988	R15238	R15488	R15738	R15988	R16238	R16488		MES interface library: Tool offset number 2
R14739	R14989	R15239	R15489	R15739	R15989	R16239	R16489		MES interface library: Tool offset number 3

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14740	R14990	R15240	R15490	R15740	R15990	R16240	R16490		MES interface library: Tool offset number 4
R14741	R14991	R15241	R15491	R15741	R15991	R16241	R16491		MES interface library: Tool offset number 5
R14742	R14992	R15242	R15492	R15742	R15992	R16242	R16492		MES interface library: Tool length offset 1
R14743	R14993	R15243	R15493	R15743	R15993	R16243	R16493		
R14744	R14994	R15244	R15494	R15744	R15994	R16244	R16494		MES interface library: Tool length offset 2
R14745	R14995	R15245	R15495	R15745	R15995	R16245	R16495		
R14746	R14996	R15246	R15496	R15746	R15996	R16246	R16496		MES interface library: Tool length offset 3
R14747	R14997	R15247	R15497	R15747	R15997	R16247	R16497		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14748	R14998	R15248	R15498	R15748	R15998	R16248	R16498		MES interface library: Tool length offset 4
R14749	R14999	R15249	R15499	R15749	R15999	R16249	R16499		
R14750	R15000	R15250	R15500	R15750	R16000	R16250	R16500		MES interface library: Tool length offset 5
R14751	R15001	R15251	R15501	R15751	R16001	R16251	R16501		
R14752	R15002	R15252	R15502	R15752	R16002	R16252	R16502		MES interface library: Tool radius offset 1
R14753	R15003	R15253	R15503	R15753	R16003	R16253	R16503		
R14754	R15004	R15254	R15504	R15754	R16004	R16254	R16504		MES interface library: Tool radius offset 2
R14755	R15005	R15255	R15505	R15755	R16005	R16255	R16505		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14756	R15006	R15256	R15506	R15756	R16006	R16256	R16506		MES interface library: Tool radius offset 3
R14757	R15007	R15257	R15507	R15757	R16007	R16257	R16507		
R14758	R15008	R15258	R15508	R15758	R16008	R16258	R16508		MES interface library: Tool radius offset 4
R14759	R15009	R15259	R15509	R15759	R16009	R16259	R16509		
R14760	R15010	R15260	R15510	R15760	R16010	R16260	R16510		MES interface library: Tool radius offset 5
R14761	R15011	R15261	R15511	R15761	R16011	R16261	R16511		
R14762	R15012	R15262	R15512	R15762	R16012	R16262	R16512		
R14763	R15013	R15263	R15513	R15763	R16013	R16263	R16513		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14780	R15030	R15280	R15530	R15780	R16030	R16280	R16530		MES interface library: Time of alarm occurrence
R14781	R15031	R15281	R15531	R15781	R16031	R16281	R16531		
R14782	R15032	R15282	R15532	R15782	R16032	R16282	R16532		MES interface library: Alarm number 1
R14783	R15033	R15283	R15533	R15783	R16033	R16283	R16533		
R14784	R15034	R15284	R15534	R15784	R16034	R16284	R16534		
R14785	R15035	R15285	R15535	R15785	R16035	R16285	R16535		
R14786	R15036	R15286	R15536	R15786	R16036	R16286	R16536		
R14787	R15037	R15287	R15537	R15787	R16037	R16287	R16537		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14788	R15038	R15288	R15538	R15788	R16038	R16288	R16538		MES interface library: Alarm number 1
R14789	R15039	R15289	R15539	R15789	R16039	R16289	R16539		
R14790	R15040	R15290	R15540	R15790	R16040	R16290	R16540		
R14791	R15041	R15291	R15541	R15791	R16041	R16291	R16541		
R14792	R15042	R15292	R15542	R15792	R16042	R16292	R16542		
R14793	R15043	R15293	R15543	R15793	R16043	R16293	R16543		
R14794	R15044	R15294	R15544	R15794	R16044	R16294	R16544		
R14795	R15045	R15295	R15545	R15795	R16045	R16295	R16545		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14796	R15046	R15296	R15546	R15796	R16046	R16296	R16546		MES interface library: Alarm number 1
R14797	R15047	R15297	R15547	R15797	R16047	R16297	R16547		
R14798	R15048	R15298	R15548	R15798	R16048	R16298	R16548		MES interface library: Alarm number 2
R14799	R15049	R15299	R15549	R15799	R16049	R16299	R16549		
R14800	R15050	R15300	R15550	R15800	R16050	R16300	R16550		
R14801	R15051	R15301	R15551	R15801	R16051	R16301	R16551		
R14802	R15052	R15302	R15552	R15802	R16052	R16302	R16552		
R14803	R15053	R15303	R15553	R15803	R16053	R16303	R16553		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14804	R15054	R15304	R15554	R15804	R16054	R16304	R16554		MES interface library: Alarm number 2
R14805	R15055	R15305	R15555	R15805	R16055	R16305	R16555		
R14806	R15056	R15306	R15556	R15806	R16056	R16306	R16556		
R14807	R15057	R15307	R15557	R15807	R16057	R16307	R16557		
R14808	R15058	R15308	R15558	R15808	R16058	R16308	R16558		
R14809	R15059	R15309	R15559	R15809	R16059	R16309	R16559		
R14810	R15060	R15310	R15560	R15810	R16060	R16310	R16560		
R14811	R15061	R15311	R15561	R15811	R16061	R16311	R16561		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14812	R15062	R15312	R15562	R15812	R16062	R16312	R16562		MES interface library: Alarm number 2
R14813	R15063	R15313	R15563	R15813	R16063	R16313	R16563		
R14814	R15064	R15314	R15564	R15814	R16064	R16314	R16564		MES interface library: Alarm number 3
R14815	R15065	R15315	R15565	R15815	R16065	R16315	R16565		
R14816	R15066	R15316	R15566	R15816	R16066	R16316	R16566		
R14817	R15067	R15317	R15567	R15817	R16067	R16317	R16567		
R14818	R15068	R15318	R15568	R15818	R16068	R16318	R16568		
R14819	R15069	R15319	R15569	R15819	R16069	R16319	R16569		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14820	R15070	R15320	R15570	R15820	R16070	R16320	R16570		MES interface library: Alarm number 3
R14821	R15071	R15321	R15571	R15821	R16071	R16321	R16571		
R14822	R15072	R15322	R15572	R15822	R16072	R16322	R16572		
R14823	R15073	R15323	R15573	R15823	R16073	R16323	R16573		
R14824	R15074	R15324	R15574	R15824	R16074	R16324	R16574		
R14825	R15075	R15325	R15575	R15825	R16075	R16325	R16575		
R14826	R15076	R15326	R15576	R15826	R16076	R16326	R16576		
R14827	R15077	R15327	R15577	R15827	R16077	R16327	R16577		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14828	R15078	R15328	R15578	R15828	R16078	R16328	R16578		MES interface library: Alarm number 3
R14829	R15079	R15329	R15579	R15829	R16079	R16329	R16579		
R14830	R15080	R15330	R15580	R15830	R16080	R16330	R16580		MES interface library: Alarm number 4
R14831	R15081	R15331	R15581	R15831	R16081	R16331	R16581		
R14832	R15082	R15332	R15582	R15832	R16082	R16332	R16582		
R14833	R15083	R15333	R15583	R15833	R16083	R16333	R16583		
R14834	R15084	R15334	R15584	R15834	R16084	R16334	R16584		
R14835	R15085	R15335	R15585	R15835	R16085	R16335	R16585		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14836	R15086	R15336	R15586	R15836	R16086	R16336	R16586		MES interface library: Alarm number 4
R14837	R15087	R15337	R15587	R15837	R16087	R16337	R16587		
R14838	R15088	R15338	R15588	R15838	R16088	R16338	R16588		
R14839	R15089	R15339	R15589	R15839	R16089	R16339	R16589		
R14840	R15090	R15340	R15590	R15840	R16090	R16340	R16590		
R14841	R15091	R15341	R15591	R15841	R16091	R16341	R16591		
R14842	R15092	R15342	R15592	R15842	R16092	R16342	R16592		
R14843	R15093	R15343	R15593	R15843	R16093	R16343	R16593		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14844	R15094	R15344	R15594	R15844	R16094	R16344	R16594		MES interface library: Alarm number 4
R14845	R15095	R15345	R15595	R15845	R16095	R16345	R16595		
R14846	R15096	R15346	R15596	R15846	R16096	R16346	R16596		MES interface library: Power ON time
R14847	R15097	R15347	R15597	R15847	R16097	R16347	R16597		
R14848	R15098	R15348	R15598	R15848	R16098	R16348	R16598		MES interface library: O number at alarm
R14849	R15099	R15349	R15599	R15849	R16099	R16349	R16599		
R14850	R15100	R15350	R15600	R15850	R16100	R16350	R16600		
R14851	R15101	R15351	R15601	R15851	R16101	R16351	R16601		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14852	R15102	R15352	R15602	R15852	R16102	R16352	R16602		MES interface library: O number at alarm
R14853	R15103	R15353	R15603	R15853	R16103	R16353	R16603		
R14854	R15104	R15354	R15604	R15854	R16104	R16354	R16604		
R14855	R15105	R15355	R15605	R15855	R16105	R16355	R16605		
R14856	R15106	R15356	R15606	R15856	R16106	R16356	R16606		
R14857	R15107	R15357	R15607	R15857	R16107	R16357	R16607		
R14858	R15108	R15358	R15608	R15858	R16108	R16358	R16608		
R14859	R15109	R15359	R15609	R15859	R16109	R16359	R16609		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14860	R15110	R15360	R15610	R15860	R16110	R16360	R16610		MES interface library: O number at alarm
R14861	R15111	R15361	R15611	R15861	R16111	R16361	R16611		
R14862	R15112	R15362	R15612	R15862	R16112	R16362	R16612		
R14863	R15113	R15363	R15613	R15863	R16113	R16363	R16613		
R14864	R15114	R15364	R15614	R15864	R16114	R16364	R16614		MES interface library: N number at alarm
R14865	R15115	R15365	R15615	R15865	R16115	R16365	R16615		
R14866	R15116	R15366	R15616	R15866	R16116	R16366	R16616		MES interface library: B number at alarm
R14867	R15117	R15367	R15617	R15867	R16117	R16367	R16617		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14868	R15118	R15368	R15618	R15868	R16118	R16368	R16618		MES interface library: G code modal status
R14869	R15119	R15369	R15619	R15869	R16119	R16369	R16619		
R14870	R15120	R15370	R15620	R15870	R16120	R16370	R16620		
R14871	R15121	R15371	R15621	R15871	R16121	R16371	R16621		
R14872	R15122	R15372	R15622	R15872	R16122	R16372	R16622		
R14873	R15123	R15373	R15623	R15873	R16123	R16373	R16623		
R14874	R15124	R15374	R15624	R15874	R16124	R16374	R16624		
R14875	R15125	R15375	R15625	R15875	R16125	R16375	R16625		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14876	R15126	R15376	R15626	R15876	R16126	R16376	R16626		MES interface library: G code modal status
R14877	R15127	R15377	R15627	R15877	R16127	R16377	R16627		
R14878	R15128	R15378	R15628	R15878	R16128	R16378	R16628		
R14879	R15129	R15379	R15629	R15879	R16129	R16379	R16629		
R14880	R15130	R15380	R15630	R15880	R16130	R16380	R16630		
R14881	R15131	R15381	R15631	R15881	R16131	R16381	R16631		
R14882	R15132	R15382	R15632	R15882	R16132	R16382	R16632		
R14883	R15133	R15383	R15633	R15883	R16133	R16383	R16633		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14884	R15134	R15384	R15634	R15884	R16134	R16384	R16634		MES interface library: G code modal status
R14885	R15135	R15385	R15635	R15885	R16135	R16385	R16635		
R14886	R15136	R15386	R15636	R15886	R16136	R16386	R16636		
R14887	R15137	R15387	R15637	R15887	R16137	R16387	R16637		
R14888	R15138	R15388	R15638	R15888	R16138	R16388	R16638		
R14889	R15139	R15389	R15639	R15889	R16139	R16389	R16639		
R14890	R15140	R15390	R15640	R15890	R16140	R16390	R16640		
R14891	R15141	R15391	R15641	R15891	R16141	R16391	R16641		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14892	R15142	R15392	R15642	R15892	R16142	R16392	R16642		MES interface library: G code modal status
R14893	R15143	R15393	R15643	R15893	R16143	R16393	R16643		
R14894	R15144	R15394	R15644	R15894	R16144	R16394	R16644		
R14895	R15145	R15395	R15645	R15895	R16145	R16395	R16645		
R14896	R15146	R15396	R15646	R15896	R16146	R16396	R16646		
R14897	R15147	R15397	R15647	R15897	R16147	R16397	R16647		
R14898	R15148	R15398	R15648	R15898	R16148	R16398	R16648		
R14899	R15149	R15399	R15649	R15899	R16149	R16399	R16649		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R14900	R15150	R15400	R15650	R15900	R16150	R16400	R16650		MES interface library: Spindle 1 maximum load
R14901	R15151	R15401	R15651	R15901	R16151	R16401	R16651		MES interface library: Spindle 2 maximum load
R14902	R15152	R15402	R15652	R15902	R16152	R16402	R16652		MES interface library: Tool number 1
R14903	R15153	R15403	R15653	R15903	R16153	R16403	R16653		MES interface library: Tool offset number 1
R14904	R15154	R15404	R15654	R15904	R16154	R16404	R16654		MES interface library: Tool length offset 1
R14905	R15155	R15405	R15655	R15905	R16155	R16405	R16655		
R14906	R15156	R15406	R15656	R15906	R16156	R16406	R16656		MES interface library: Tool radius offset 1
R14907	R15157	R15407	R15657	R15907	R16157	R16407	R16657		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R20200		Skip coordinate (PLC axis 1st axis) ▲	R20208		Skip coordinate (PLC axis 3rd axis) ▲
R20201			R20209		
R20202			R20210		
R20203			R20211		
R20204		Skip coordinate (PLC axis 2nd axis) ▲	R20212		Skip coordinate (PLC axis 4th axis) ▲
R20205			R20213		
R20206			R20214		
R20207			R20215		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R20216		Skip coordinate (PLC axis 5th axis) ▲	R20224		
R20217			R20225		
R20218			R20226		
R20219			R20227		
R20220		Skip coordinate (PLC axis 6th axis) ▲	R20228		
R20221			R20229		
R20222			R20230		
R20223			R20231		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R20232		Feedback machine position axis (PLC axis 1st axis) ▲	R20240		Feedback machine position axis (PLC axis 3rd axis) ▲
R20233			R20241		
R20234			R20242		
R20235			R20243		
R20236		Feedback machine position axis (PLC axis 2nd axis) ▲	R20244		Feedback machine position axis (PLC axis 4th axis) ▲
R20237			R20245		
R20238			R20246		
R20239			R20247		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R20248		Feedback machine position axis (PLC axis 5th axis) ▲	R20256		
R20249			R20257		
R20250			R20258		
R20251			R20259		
R20252		Feedback machine position axis (PLC axis 6th axis) ▲	R20260		
R20253			R20261		
R20254			R20262		
R20255			R20263		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R20264		Servo deflection amount(PLC axis 1st axis) ▲	R20272		Servo deflection amount(PLC axis 5th axis) ▲
R20265			R20273		
R20266		Servo deflection amount(PLC axis 2nd axis) ▲	R20274		Servo deflection amount(PLC axis 6th axis) ▲
R20267			R20275		
R20268		Servo deflection amount(PLC axis 3rd axis) ▲	R20276		
R20269			R20277		
R20270		Servo deflection amount(PLC axis 4th axis) ▲	R20278		
R20271			R20279		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R20280	RNASP	FL-net : Reference node address designation ▲	R20288		EcoMonitorLight connection: Read start bit
R20281	PNASP	FL-net : Participating node top address designation ▲	R20289		EcoMonitorLight connection: Station No.
R20282			R20290		EcoMonitorLight connection: Register address
R20283			R20291		EcoMonitorLight connection: Size of data to read
R20284			R20292		
R20285			R20293		
R20286			R20294		
R20287			R20295		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
R20480	TP_INVALID	Touchscreen operation disabled	R20488		
R20481			R20489		
R20482			R20490		
R20483			R20491		
R20484			R20492		
R20485			R20493		
R20486			R20494		
R20487			R20495		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R22500	R22700	R22900	R23100	R23300	R23500	R23700	R23900		Program restart : Restart position return check invalid ▲
R22501	R22701	R22901	R23101	R23301	R23501	R23701	R23901		
R22502	R22702	R22902	R23102	R23302	R23502	R23702	R23902		
R22503	R22703	R22903	R23103	R23303	R23503	R23703	R23903		
R22504	R22704	R22904	R23104	R23304	R23504	R23704	R23904		
R22505	R22705	R22905	R23105	R23305	R23505	R23705	R23905		
R22506	R22706	R22906	R23106	R23306	R23506	R23706	R23906		
R22507	R22707	R22907	R23107	R23307	R23507	R23707	R23907		

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
R22692	R22892	R23092	R23292	R23492	R23692	R23892	R24092		Load monitor I : Cutting torque estimation target axis
R22693	R22893	R23093	R23293	R23493	R23693	R23893	R24093		Hob machining: work piece axis selection ▲
R22694	R22894	R23094	R23294	R23494	R23694	R23894	R24094	SPPWS	Tool spindle synchronization IB : Spindle-spindle polygon cut workpiece axis selection ▲
R22695	R22895	R23095	R23295	R23495	R23695	R23895	R24095		
R22696	R22896	R23096	R23296	R23496	R23696	R23896	R24096		
R22697	R22897	R23097	R23297	R23497	R23697	R23897	R24097		
R22698	R22898	R23098	R23298	R23498	R23698	R23898	R24098		
R22699	R22899	R23099	R23299	R23499	R23699	R23899	R24099		

2.5 Special Relay/Register

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SM00			SM08		
SM01			SM09		
SM02			SM10		
SM03			SM11		
SM04			SM12		
SM05			SM13		
SM06			SM14		
SM07			SM15		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SM16		Temperature rise	SM24		
SM17			SM25		
SM18			SM26		
SM19			SM27		
SM20			SM28		
SM21			SM29		
SM22			SM30		
SM23			SM31		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SM32			SM40		
SM33			SM41		
SM34			SM42		
SM35			SM43		
SM36			SM44		
SM37			SM45		
SM38			SM46		
SM39			SM47		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SM48			SM56		
SM49			SM57		
SM50			SM58		
SM51			SM59		
SM52			SM60		
SM53			SM61		
SM54			SM62		
SM55			SM63		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SM64			SM72		
SM65			SM73		
SM66			SM74		
SM67			SM75		
SM68			SM76		
SM69			SM77		
SM70			SM78		
SM71			SM79		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SM80			SM88		
SM81			SM89		
SM82			SM90		
SM83			SM91		
SM84			SM92		
SM85			SM93		
SM86			SM94		
SM87			SM95		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SM96			SM104		
SM97			SM105		
SM98			SM106		
SM99			SM107		
SM100			SM108		
SM101			SM109		
SM102			SM110		
SM103			SM111		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SM112			SM120		
SM113			SM121		
SM114			SM122		
SM115			SM123		
SM116			SM124		
SM117			SM125		
SM118			SM126		
SM119			SM127		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SB0000		Data link restart	SB0008		Line test request
SB0001		Refresh instruction at standby master switching	SB0009		Parameter setting test request
SB0002		Data link stop	SB000A		
SB0003			SB000B		
SB0004		Temporary error cancel request	SB000C		Forced master switching
SB0005		Temporary error cancel canceling request	SB000D		
SB0006			SB000E		
SB0007			SB000F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SB0040		Data link restart acceptance	SB0048		Temporary error cancel acceptance status
SB0041		Data link restart complete	SB0049		Temporary error cancel complete status
SB0042		Refresh instruction acknowledgment status at standby master switching	SB004A		Temporary error cancel acceptance status
SB0043		Refresh instruction complete status at standby master switching	SB004B		Temporary error cancel acceptance status
SB0044		Data link stop acceptance	SB004C		Line test acceptance status
SB0045		Data link stop complete	SB004D		Line test complete status
SB0046		Forced master switching executable status	SB004E		Parameter setting test acknowledgment status
SB0047			SB004F		Parameter setting test completion status

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SB0050		Offline test status	SB0058		
SB0051			SB0059		
SB0052			SB005A		Master switching request acknowledgment
SB0053			SB005B		Master switching request complete
SB0054		Shipping test acceptance	SB005C		Forced master switching request acknowledgment
SB0055		Shipping test complete status	SB005D		Forced master switching request complete
SB0056			SB005E		
SB0057			SB005F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SB0060		Host mode	SB0068		
SB0061		Host type	SB0069		
SB0062		Host standby master station setting status	SB006A		Switch setting status
SB0063			SB006B		Host station operation status
SB0064			SB006C		Link status
SB0065		Host station operation status	SB006D		Parameter setting status
SB0066		Number of host occupied stations	SB006E		Host station operation status
SB0067			SB006F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SB0070		Master station information	SB0078		Host station switch change detection
SB0071		Standby master station information	SB0079		Master station return specification information
SB0072			SB007A		
SB0073		Operation specification when driver has an error	SB007B		Host master/standby master operation status
SB0074		Reserved station specified status	SB007C		
SB0075		Error cancel station specified status	SB007D		
SB0076		Temporary error cancel station setting information	SB007E		
SB0077		Parameter receive status	SB007F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SB0080		Other station data link status	SB0088		
SB0081		Other station watchdog timer error status	SB0089		
SB0082		Other station fuse blown status	SB008A		
SB0083		Other station switch change status	SB008B		
SB0084			SB008C		
SB0085			SB008D		
SB0086			SB008E		
SB0087			SB008F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SB0090		Host line status	SB0098		
SB0091			SB0099		
SB0092			SB009A		
SB0093			SB009B		
SB0094		Transient transmission status	SB009C		
SB0095		Master station transient transmission status	SB009D		
SB0096			SB009E		
SB0097			SB009F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SB00B0			SB00B8		
SB00B1			SB00B9		
SB00B2			SB00BA		
SB00B3			SB00BB		
SB00B4		Standby master station test result	SB00BC		
SB00B5			SB00BD		
SB00B6			SB00BE		
SB00B7			SB00BF		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW0000			SW0008		Line test station setting
SW0001			SW0009		Monitoring time setting
SW0002			SW000A		Driver monitoring time setting
SW0003		Multiple temporary error cancel station specification	SW000B		
SW0004		Temporary error cancel station specification	SW000C		
SW0005			SW000D		
SW0006			SW000E		
SW0007			SW000F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW0040			SW0048		
SW0041		Data link restart result	SW0049		Temporary error cancel station result
SW0042			SW004A		
SW0043		Refresh instruction at standby master switching result	SW004B		Temporary error cancel station specification cancel result
SW0044			SW004C		
SW0045		Data link stop result	SW004D		Line test result
SW0046			SW004E		
SW0047			SW004F		Parameter setting test result

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW0050			SW0058		Interface board status
SW0051			SW0059		Transmission speed setting
SW0052			SW005A		Add-on board switch setting status
SW0053			SW005B		
SW0054			SW005C		
SW0055			SW005D		Forced master switching instruction result
SW0056			SW005E		
SW0057			SW005F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW0060		Mode setting status	SW0068		Host parameter status
SW0061		Host station number	SW0069		Installation status
SW0062		Operation setting status	SW006A		Switch setting status
SW0063			SW006B		Host station operation status
SW0064		No. of retries information	SW006C		Host data link status
SW0065		No. of automatic return stations	SW006D		Max. link scan time
SW0066		Delay timer	SW006E		Current link scan time
SW0067			SW006F		Min. link scan time

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW0070		Total number of stations	SW0078		Error cancel station specified status
SW0071		Max. communication station number	SW0079		
SW0072		Number of connected modules	SW007A		
SW0073		Standby master station number	SW007B		
SW0074		Reserved station specified status	SW007C		Temporary error cancel status
SW0075			SW007D		
SW0076			SW007E		
SW0077			SW007F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW0080		Other station data link status	SW0088		Other station fuse blown status
SW0081			SW0089		
SW0082			SW008A		
SW0083			SW008B		
SW0084		Other station watchdog timer error occurrence status	SW008C		Other station switch change status
SW0085			SW008D		
SW0086			SW008E		
SW0087			SW008F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW0090		Line status	SW0098		Station number overlap status
SW0091			SW0099		
SW0092			SW009A		
SW0093			SW009B		
SW0094		Transient transmission status	SW009C		Installation/Parameter matching status
SW0095			SW009D		
SW0096			SW009E		
SW0097			SW009F		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW00B0			SW00B8		Line test 2 result
SW00B1			SW00B9		
SW00B2			SW00BA		
SW00B3			SW00BB		
SW00B4		Line test 1 result	SW00BC		
SW00B5			SW00BD		
SW00B6			SW00BE		
SW00B7			SW00BF		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW00C0		No. of retries	SW00C8		Overflow
SW00C1		TIME error	SW00C9		
SW00C2		CRC error	SW00CA		
SW00C3		Abort error	SW00CB		
SW00C4		H/W error	SW00CC		
SW00C5		Line error	SW00CD		
SW00C6		S/W error	SW00CE		
SW00C7		Illegal XCD	SW00CF		

Device	Abbrev.	Signal name	Device	Abbrev.	Signal name
SW0140		Station type (3)	SW0148		Parameter mode
SW0141			SW0149		Host parameter mode
SW0142			SW014A		
SW0143			SW014B		
SW0144		Installation/Parameter matching status (2)	SW014C		
SW0145			SW014D		
SW0146			SW014E		
SW0147			SW014F		

2.6 ZR Devices

PLC → CNC

Device	Abbrev.	Signal name
ZR256	*SLSRm	SLS OBSERVATION REQUEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR257	*SLSRm	SLS OBSERVATION REQUEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR258	*SLPRm	SLP OBSERVATION REQUEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR259	*SLPRm	SLP OBSERVATION REQUEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR260	*SSMRm	SSM REQUEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR261	*SSMRm	SSM REQUEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR262	*SCARm	SAFE CAM REQUEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR263	*SCARm	SAFE CAM REQUEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR264	*SOSRm	SOS OBSERVATION REQUEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR265	*SOSRm	SOS OBSERVATION REQUEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR266	*SS1Rm	SAFE STOP 1 REQUEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR267	*SS1Rm	SAFE STOP 1 REQUEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR268	*SS2Rm	SAFE STOP 2 REQUEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR269	*SS2Rm	SAFE STOP 2 REQUEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR270	*STORm	SAFE TORQUE OFF REQUEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR271	*STORm	SAFE TORQUE OFF REQUEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR272	*SBCRm	SBC MOTOR BRAKE STARTING REQUEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR273	*SBCRm	SBC MOTOR BRAKE STARTING REQUEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR274	SBTSTEXm	EXTERNAL BRAKE SBT START (CONTROL AXIS) 1st axis ～ 16th axis
ZR275	SBTSTEXm	EXTERNAL BRAKE SBT START (CONTROL AXIS) 17st axis ～ 32th axis
ZR276	SBTSTMOm	MOTOR BRAKE SBT START (CONTROL AXIS) 1st axis ～ 16th axis
ZR277	SBTSTMOm	MOTOR BRAKE SBT START (CONTROL AXIS) 17st axis ～ 32th axis
ZR278	SFABSPFXm	SAFETY ABSOLUTE POSITION CONFIRM (CONTROL AXIS) 1st axis ～ 16th axis
ZR279	SFABSPFXm	SAFETY ABSOLUTE POSITION CONFIRM (CONTROL AXIS) 17st axis ～ 32th axis
ZR280	SRSTm	SAFETY RESET (CONTROL AXIS) 1st axis ～ 16th axis
ZR281	SRSTm	SAFETY RESET (CONTROL AXIS) 17st axis ～ 32th axis

Device	Abbrev.	bit	Signal name
ZR312 ～ ZR343	SLSMImn	bit0	SLS SPEED CHANGE INPUT (CONTROL AXIS) 1st axis ～ 32th axis
	SLSMImn	bit1	SLS SPEED CHANGE INPUT (CONTROL AXIS) 1st axis ～ 32th axis
		bit2	vacant
		bit3	vacant
	SLSOVRImn	bit4	SLS SPEED OVERRIDE INPUT (CONTROL AXIS) 1st axis ～ 32th axis
	SLSOVRImn	bit5	SLS SPEED OVERRIDE INPUT (CONTROL AXIS) 1st axis ～ 32th axis
	SLSOVRImn	bit6	SLS SPEED OVERRIDE INPUT (CONTROL AXIS) 1st axis ～ 32th axis
	SLSOVRImn	bit7	SLS SPEED OVERRIDE INPUT (CONTROL AXIS) 1st axis ～ 32th axis
		bit8	vacant
		bit9	vacant
		bitA	vacant
		bitB	vacant
		bitC	vacant
		bitD	vacant
		bitE	vacant
		bitF	vacant

Device	Abbrev.	bit	Signal name
ZR344 ～ ZR375	SLPMImn	bit0	SLP POSITION CHANGE INPUT (CONTROL AXIS) 1st axis ～ 32th axis
	SLPMImn	bit1	SLP POSITION CHANGE INPUT (CONTROL AXIS) 1st axis ～ 32th axis
		bit2	vacant
		bit3	vacant
		bit4	vacant
		bit5	vacant
		bit6	vacant
		bit7	vacant
		bit8	vacant
		bit9	vacant
		bitA	vacant
		bitB	vacant
		bitC	vacant
		bitD	vacant
		bitE	vacant
		bitF	vacant

Device	Abbrev.	Signal name
ZR440	*SLSSRm	SLS OBSERVATION REQUEST (SPINDLE) 1st SP ～ 8th SP
ZR442	*SSMSRm	SSM REQUEST (SPINDLE) 1st SP ～ 8th SP
ZR444	*SOSSRm	SOS OBSERVATION REQUEST (SPINDLE) 1st SP ～ 8th SP
ZR445	*SS1SRm	SAFE STOP 1 REQUEST (SPINDLE) 1st SP ～ 8th SP
ZR446	*SS2SRm	SAFE STOP 2 REQUEST (SPINDLE) 1st SP ～ 8th SP
ZR447	*STOSRm	SAFE TORQUE OFF REQUEST (SPINDLE) 1st SP ～ 8th SP
ZR452	SRSTSm	SAFETY REQUEST (SPINDLE) 1st SP ～ 8th SP

Device	Abbrev.	bit	Signal name
ZR468 ～ ZR475	SLSSMImn	bit0	SLS SPEED CHANGE INPUT (SPINDLE) 1st SP ～ 8th SP
	SLSSMImn	bit1	SLS SPEED CHANGE INPUT (SPINDLE) 1st SP ～ 8th SP
		bit2	vacant
		bit3	vacant
	SLSSOVRImn	bit4	SLS SPEED OVERRIDE INPUT (SPINDLE) 1st SP ～ 8th SP
	SLSSOVRImn	bit5	SLS SPEED OVERRIDE INPUT (SPINDLE) 1st SP ～ 8th SP
	SLSSOVRImn	bit6	SLS SPEED OVERRIDE INPUT (SPINDLE) 1st SP ～ 8th SP
	SLSSOVRImn	bit7	SLS SPEED OVERRIDE INPUT (SPINDLE) 1st SP ～ 8th SP
		bit8	vacant
		bit9	vacant
		bitA	vacant
		bitB	vacant
		bitC	vacant
		bitD	vacant
		bitE	vacant
		bitF	vacant

Device	Abbrev.	Signal name
ZR532	SARLS	SPECIAL SAFETY ALARM CANCEL (SYSTEM COMMON)
ZR1280	SIOOFFCHK	OUTPUT OFF CHECK REQUEST

CNC → PLC

Device	Abbrev.	Signal name
ZR544	SLSEm	SLS OBSERVATION IS ACTIVE (CONTROL AXIS) 1st axis ～ 16th axis
ZR545	SLSEm	SLS OBSERVATION IS ACTIVE (CONTROL AXIS) 17st axis ～ 32th axis
ZR546	SLSSm	UNDER SLS LIMIT (CONTROL AXIS) 1st axis ～ 16th axis
ZR547	SLSSm	UNDER SLS LIMIT (CONTROL AXIS) 17st axis ～ 32th axis
ZR548	SLPEm	SLP OBSERVATION IS ACTIVE (CONTROL AXIS) 1st axis ～ 16th axis
ZR549	SLPEm	SLP OBSERVATION IS ACTIVE (CONTROL AXIS) 17st axis ～ 32th axis
ZR550	SLPSm	IN SLP RANGE (CONTROL AXIS) 1st axis ～ 16th axis
ZR551	SLPSm	IN SLP RANGE (CONTROL AXIS) 17st axis ～ 32th axis
ZR552	SSMEm	SSM IS ACTIVE (CONTROL AXIS) 1st axis ～ 16th axis
ZR553	SSMEm	SSM IS ACTIVE (CONTROL AXIS) 17st axis ～ 32th axis
ZR554	SCAEm	SAFE CAM IS ACTIVE (CONTROL AXIS) 1st axis ～ 16th axis
ZR555	SCAEm	SAFE CAM IS ACTIVE (CONTROL AXIS) 17st axis ～ 32th axis
ZR556	SOSEm	SOS IS ACTIVE (CONTROL AXIS) 1st axis ～ 16th axis
ZR557	SOSEm	SOS IS ACTIVE (CONTROL AXIS) 17st axis ～ 32th axis
ZR558	SOSSm	IN SOS STOP (CONTROL AXIS) 1st axis ～ 16th axis
ZR559	SOSSm	IN SOS STOP (CONTROL AXIS) 17st axis ～ 32th axis
ZR560	SS1Em	SS1 IS ACTIVE (CONTROL AXIS) 1st axis ～ 16th axis
ZR561	SS1Em	SS1 IS ACTIVE (CONTROL AXIS) 17st axis ～ 32th axis
ZR562	SS1Sm	IN SAFE STOP 1 (CONTROL AXIS) 1st axis ～ 16th axis
ZR563	SS1Sm	IN SAFE STOP 1 (CONTROL AXIS) 17st axis ～ 32th axis
ZR564	SS2Em	SS2 IS ACTIVE (CONTROL AXIS) 1st axis ～ 16th axis
ZR565	SS2Em	SS2 IS ACTIVE (CONTROL AXIS) 17st axis ～ 32th axis
ZR566	STOEm	STO IS ACTIVE (CONTROL AXIS) 1st axis ～ 16th axis
ZR567	STOEm	STO IS ACTIVE (CONTROL AXIS) 17st axis ～ 32th axis
ZR568	STOSm	IN SAFE TORQUE OFF (CONTROL AXIS) 1st axis ～ 16th axis
ZR569	STOSm	IN SAFE TORQUE OFF (CONTROL AXIS) 17st axis ～ 32th axis
ZR570	SBCEm	IN SBC MOTOR BRAKE ENABLED (CONTROL AXIS) 1st axis ～ 16th axis
ZR571	SBCEm	IN SBC MOTOR BRAKE ENABLED (CONTROL AXIS) 17st axis ～ 32th axis
ZR572	SBCSm	IN SBC MOTOR BRAKE START SIGNAL (CONTROL AXIS) 1st axis ～ 16th axis
ZR573	SBCSm	IN SBC MOTOR BRAKE START SIGNAL (CONTROL AXIS) 17st axis ～ 32th axis
ZR574	SBTNFEXm	EXTERNAL BRAKE SBT INCOMPLETE (CONTROL AXIS) 1st axis ～ 16th axis
ZR575	SBTNFEXm	EXTERNAL BRAKE SBT INCOMPLETE (CONTROL AXIS) 17st axis ～ 32th axis
ZR576	SBTEXBRm	IN SBT EXTERNAL BRAKE TEST (CONTROL AXIS) 1st axis ～ 16th axis
ZR577	SBTEXBRm	IN SBT EXTERNAL BRAKE TEST (CONTROL AXIS) 17st axis ～ 32th axis
ZR578	SBTNFMOm	MOTOR BRAKE SBT INCOMPLETE (CONTROL AXIS) 1st axis ～ 16th axis
ZR579	SBTNFMOm	MOTOR BRAKE SBT INCOMPLETE (CONTROL AXIS) 17st axis ～ 32th axis
ZR580	SFABSPESTm	IN SAFETY ABSOLUTE POSITION ESTABLISHING (CONTROL AXIS) 1st axis ～ 16th axis
ZR581	SFABSPESTm	IN SAFETY ABSOLUTE POSITION ESTABLISHING (CONTROL AXIS) 17st axis ～ 32th axis
ZR582	SFERR_SVm	SMART SAFETY OBSERVATION ERROR OCCURING SERVO AXIS (CONTROL AXIS) 1st axis ～ 16th axis
ZR583	SFERR_SVm	SMART SAFETY OBSERVATION ERROR OCCURING SERVO AXIS (CONTROL AXIS) 17st axis ～ 32th axis
ZR584	SFWRG_SVm	SMART SAFETY OBSERVATION WARNING OCCURING SERVO AXIS (CONTROL AXIS) 1st axis ～ 16th axis
ZR585	SFWRG_SVm	SMART SAFETY OBSERVATION WARNING OCCURING SERVO AXIS (CONTROL AXIS) 17st axis ～ 32th axis

Device	Abbrev.	bit	Signal name
ZR608 ～ ZR639	SLSMOmn	bit0	SLS SPEED CHANGE OUTPUT (CONTROL AXIS) 1st axis ～ 32th axis
	SLSMOmn	bit1	SLS SPEED CHANGE OUTPUT (CONTROL AXIS) 1st axis ～ 32th axis
		bit2	vacant
		bit3	vacant
	SLSOVROmn	bit4	SLS SPEED OVERRIDE OUTPUT (CONTROL AXIS) 1st axis ～ 32th axis
	SLSOVROmn	bit5	SLS SPEED OVERRIDE OUTPUT (CONTROL AXIS) 1st axis ～ 32th axis
	SLSOVROmn	bit6	SLS SPEED OVERRIDE OUTPUT (CONTROL AXIS) 1st axis ～ 32th axis
	SLSOVROmn	bit7	SLS SPEED OVERRIDE OUTPUT (CONTROL AXIS) 1st axis ～ 32th axis
		bit8	vacant
		bit9	vacant
		bitA	vacant
		bitB	vacant
		bitC	vacant
		bitD	vacant
		bitE	vacant
		bitF	vacant

Device	Abbrev.	Signal name
ZR640 ～ ZR671	SLPMOmn	SLP POSITION CHANGE OUTPUT (CONTROL AXIS) 1st axis ～ 32th axis
ZR672 ～ ZR703	SSMSmn	UNDER SSM SAFE SPEED (CONTROL AXIS) 1st axis ～ 32th axis
ZR704 ～ ZR767	SCASmn	SAFE CAM POSITION (CONTROL AXIS) 1st axis ～ 32th axis
ZR768 ～ ZR893	SBTPOSm	SBT START POSITION (CONTROL AXIS) 1st axis ～ 32th axis

Device	Abbrev.	Signal name
ZR1024	SLSSEm	SLS OBSERVATION IS ACTIVE (SPINDLE) 1st SP ～ 8th SP
ZR1025	SLSSSm	UNDER SLS LIMIT (SPINDLE) 1st SP ～ 8th SP
ZR1028	SSMSEm	SSM IS ACTIVE (SPINDLE) 1st SP ～ 8th SP
ZR1030	SOSSEm	SOS IS ACTIVE (SPINDLE) 1st SP ～ 8th SP
ZR1031	SOSSSm	IN SOS STOP (SPINDLE) 1st SP ～ 8th SP
ZR1032	SS1SEm	SS1 IS ACTIVE (SPINDLE) 1st SP ～ 8th SP
ZR1033	SS1SSm	IN SAFE STOP (SPINDLE) 1st SP ～ 8th SP
ZR1034	SS2SEm	SS2 IS ACTIVE (SPINDLE) 1st SP ～ 8th SP
ZR1035	STOSEm	STO IS ACTIVE (SPINDLE) 1st SP ～ 8th SP
ZR1036	STOSSm	IN SAFE TORQUE OFF (SPINDLE) 1st SP ～ 8th SP
ZR1043	SFERR_SPm	SMART SAFETY OBSERVATION ERROR OCCURING SPINDLE (SPINDLE) 1st SP ～ 8th SP
ZR1044	SFWRG_SPm	SMART SAFETY OBSERVATION WARNING OCCURING SPINDLE (SPINDLE) 1st SP ～ 8th SP

Device	Abbrev.	bit	Signal name
ZR1056 ～ ZR1063	SLSSMOmn	bit0	SLS SPEED CHANGE OUTPUT (SPINDLE) 1st SP ～ 8th SP
	SLSSMOmn	bit1	SLS SPEED CHANGE OUTPUT (SPINDLE) 1st SP ～ 8th SP
		bit2	vacant
		bit3	vacant
	SLSSOVROmn	bit4	SLS SPEED OVERRIDE OUTPUT (SPINDLE) 1st SP ～ 8th SP
	SLSSOVROmn	bit5	SLS SPEED OVERRIDE OUTPUT (SPINDLE) 1st SP ～ 8th SP
	SLSSOVROmn	bit6	SLS SPEED OVERRIDE OUTPUT (SPINDLE) 1st SP ～ 8th SP
	SLSSOVROmn	bit7	SLS SPEED OVERRIDE OUTPUT (SPINDLE) 1st SP ～ 8th SP
		bit8	vacant
		bit9	vacant
		bitA	vacant
		bitB	vacant
		bitC	vacant
		bitD	vacant
		bitE	vacant
		bitF	vacant

Device	Abbrev.	Signal name
ZR1088 ～ ZR1095	SSMSSmn	UNDER SSM SAFE SPEED (SPINDLE) 1st SP ～ 8th SP

Device	Abbrev.	Signal name
ZR1264	SEXTEMG	IN SAFETY EXTERNAL EMERGENCY STOP (SYSTEM COMMON)
ZR1268	SFERR_VNO	V NUMBER OF SMART SAFETY OBSERVATION ERROR (SYSTEM COMMON)
ZR1269	SFERR_ENO	E NUMBER OF SMART SAFETY OBSERVATION ERROR (SYSTEM COMMON)
ZR1270	SFWRG_VNO	V NUMBER OF SMART SAFETY OBSERVATION WARNING (SYSTEM COMMON)
ZR1271	SFWRG_ENO	W NUMBER OF SMART SAFETY OBSERVATION WARNING (SYSTEM COMMON)

Device	Abbrev.	Signal name
ZR1536	SIOERRSTS	SAFETY I/O OBSERVATION STATE
ZR1538	SIOERRUNIT	SAFETY I/O UNIT OBSERVATION STATE
ZR1540	SIOERRUNITSTS1n	SAFETY I/O UNIT OBSERVATION ERROR DETAILS Unit1
ZR1541	SIOERRUNITSTS2n	SAFETY I/O UNIT OBSERVATION ERROR DETAILS Unit2
ZR1542	SIOERRUNITSTS3n	SAFETY I/O UNIT OBSERVATION ERROR DETAILS Unit3
ZR1543	SIOERRUNITSTS4n	SAFETY I/O UNIT OBSERVATION ERROR DETAILS Unit4
ZR1544	SIOERRUNITSTS5n	SAFETY I/O UNIT OBSERVATION ERROR DETAILS Unit5
ZR1545	SIOERRUNITSTS6n	SAFETY I/O UNIT OBSERVATION ERROR DETAILS Unit6
ZR1546	SIOERRUNITSTS7n	SAFETY I/O UNIT OBSERVATION ERROR DETAILS Unit7
ZR1547	SIOERRUNITSTS8n	SAFETY I/O UNIT OBSERVATION ERROR DETAILS Unit8

2.7 Classified for Each Application

(Note) Signals with " ▲ " are prepared for specific machine tool builders.

(1) PLC axis indexing interfaces

Device No.		Abbrev.	Signal name
	bit		
R8098	bit0		PLC indexing axis operation adjustment mode valid (common for all axes)

PLC indexing axis						Abbrev.	Signal name
1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis		
R8050	R8056	R8062	R8068	R8074	R8080	AUXCM4	PLC axis indexing control command 4
R8051	R8057	R8063	R8069	R8075	R8081	AUXCM3	PLC axis indexing control command 3
R8052	R8058	R8064	R8070	R8076	R8082	AUXCM2	PLC axis indexing control command 2
R8053	R8059	R8065	R8071	R8077	R8083	AUXCM1	PLC axis indexing control command 1
R8054	R8060	R8066	R8072	R8078	R8084		PLC axis indexing control command position (L)
R8055	R8061	R8067	R8073	R8079	R8085		PLC axis indexing control command position (H)

Device No.		Abbrev.	Signal name
	bit		
R8048	bit0		PLC indexing axis in operation adjustment mode 1st axis
	bit1		PLC indexing axis in operation adjustment mode 2nd axis
	bit2		PLC indexing axis in operation adjustment mode 3rd axis
	bit3		PLC indexing axis in operation adjustment mode 4th axis
	bit4		PLC indexing axis in operation adjustment mode 5th axis
	bit5		PLC indexing axis in operation adjustment mode 6th axis

PLC indexing axis						Abbrev.	Signal name
1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis		
R8000	R8006	R8012	R8018	R8024	R8030	AUXST4	PLC axis indexing control status 4
R8001	R8007	R8013	R8019	R8025	R8031	AUXST3	PLC axis indexing control status 3
R8002	R8008	R8014	R8020	R8026	R8032	AUXST2	PLC axis indexing control status 2
R8003	R8009	R8015	R8021	R8027	R8033	AUXST1	PLC axis indexing control status 1
R8004	R8010	R8016	R8022	R8028	R8034		PLC axis indexing control machine position (L)
R8005	R8011	R8017	R8023	R8029	R8035		PLC axis indexing control machine position (H)

(2) Other file registers (R)

Device No.	Signal name
R2100 to R2397	Pallet program data (Drive unit -> PLC)
R4100 to R4103	Pallet program data (PLC -> Drive unit)
R7500 to R7799	PLC constant parameters (corresponds to parameters #18001 to #18150)
R7800 to R7897	PLC bit selection parameters (corresponds to parameters #6401 to #6596)
R8290 to R8299	Optimum acceleration/deceleration estimated inertia level (spindle)
R12800 to R13099	Computer link interfaces
R13200 to R13299	Special table interfaces
R17300 to R18299	Modbus input/outpu device ▲

M system		L system	
R10600 to R11779	ATC command control information	R10600 and later	Tool life management interfaces I, II
R11800 and later	Tool life management interfaces		

(3) Other inputs/outputs (X, Y)

Device No.	Signal name
X680 to X6BF	PLC switch #1 to 64
X6F8 to X6FF	Skip input 1 to 8 for monitor
Y680 to Y6BF	PLC switch reversed display #1 to 64
Y6C0 to Y6FF	PLC switch for reverse #1 to 64

(4) Fixed (semi-fixed) devices

Device No.	Signal name
X18 to X1B	Reference position return near-point detection 1 to 4
X20 to X23	Stroke end (-) 1 to 4
X28 to X2B	Stroke end (+) 1 to 4
X5C to X5F	Reference position return near-point detection 5 to 8
X64 to X67	Stroke end (-) 5 to 8
X6C to X6F	Stroke end (+) 5 to 8

(5) Maintenance

Device No.	Signal name
R13170	CRC count (servo #1)
R13171	CRC count (servo #2)
R13172	Address illegal (servo #1)
R13173	Address illegal (servo #2)
R13174	CRC count (display unit)
R13175	Address illegal (display unit)
R13176	CRC count (servo #3)
R13177	Address illegal (servo #3)

(6) Spindle related devices

CNC -> PLC

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
X1880	X18E0	X1940	X19A0	X1A00	X1A60	X1AC0	X1B20	SUPP	Spindle rotation upper limit exceeded
X1881	X18E1	X1941	X19A1	X1A01	X1A61	X1AC1	X1B21	SLOW	Spindle rotation lower limit exceeded
X1882	X18E2	X1942	X19A2	X1A02	X1A62	X1AC2	X1B22	SIGE	S command gear No. illegal
X1883	X18E3	X1943	X19A3	X1A03	X1A63	X1AC3	X1B23	SOVE	S command max./min. command value over
X1884	X18E4	X1944	X19A4	X1A04	X1A64	X1AC4	X1B24	SNGE	S command no gear selected
X1885	X18E5	X1945	X19A5	X1A05	X1A65	X1AC5	X1B25	GR1	Spindle gear shift command 1
X1886	X18E6	X1946	X19A6	X1A06	X1A66	X1AC6	X1B26	GR2	Spindle gear shift command 2
X1887	X18E7	X1947	X19A7	X1A07	X1A67	X1AC7	X1B27	-	(Always "0")
X1888	X18E8	X1948	X19A8	X1A08	X1A68	X1AC8	X1B28		Spindle 2nd in-position
X1889	X18E9	X1949	X19A9	X1A09	X1A69	X1AC9	X1B29	CDO	Current detection
X188A	X18EA	X194A	X19AA	X1A0A	X1A6A	X1ACA	X1B2A	VRO	Speed detection
X188B	X18EB	X194B	X19AB	X1A0B	X1A6B	X1ACB	X1B2B	FLO	In spindle alarm
X188C	X18EC	X194C	X19AC	X1A0C	X1A6C	X1ACC	X1B2C	ZSO	Zero speed
X188D	X18ED	X194D	X19AD	X1A0D	X1A6D	X1ACD	X1B2D	USO	Spindle up-to-speed
X188E	X18EE	X194E	X19AE	X1A0E	X1A6E	X1ACE	X1B2E	ORAO	Spindle in-position
X188F	X18EF	X194F	X19AF	X1A0F	X1A6F	X1ACF	X1B2F	LCSA	In L coil selection
X1890	X18F0	X1950	X19B0	X1A10	X1A70	X1AD0	X1B30	SMA	Spindle ready-ON
X1891	X18F1	X1951	X19B1	X1A11	X1A71	X1AD1	X1B31	SSA	Spindle servo-ON
X1892	X18F2	X1952	X19B2	X1A12	X1A72	X1AD2	X1B32	SEMG	In spindle emergency stop
X1893	X18F3	X1953	X19B3	X1A13	X1A73	X1AD3	X1B33	SSRN	In spindle forward run
X1894	X18F4	X1954	X19B4	X1A14	X1A74	X1AD4	X1B34	SSRI	In spindle reverse run
X1895	X18F5	X1955	X19B5	X1A15	X1A75	X1AD5	X1B35		Z phase passed
X1896	X18F6	X1956	X19B6	X1A16	X1A76	X1AD6	X1B36	SIMP	Position loop in-position
X1897	X18F7	X1957	X19B7	X1A17	X1A77	X1AD7	X1B37	STLQ	In spindle torque limit
X1898	X18F8	X1958	X19B8	X1A18	X1A78	X1AD8	X1B38		
X1899	X18F9	X1959	X19B9	X1A19	X1A79	X1AD9	X1B39		
X189A	X18FA	X195A	X19BA	X1A1A	X1A7A	X1ADA	X1B3A		Spindle torque limit reached
X189D	X18FD	X195D	X19BD	X1A1D	X1A7D	X1ADD	X1B3D	SD2	Speed detection 2
X189E	X18FE	X195E	X19BE	X1A1E	X1A7E	X1ADE	X1B3E	MCSA	In M coil selection
X189F	X18FF	X195F	X19BF	X1A1F	X1A7F	X1ADF	X1B3F		Index positioning completion

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
X18A0	X1900	X1960	X19C0	X1A20	X1A80	X1AE0	X1B40	ENB	Spindle enable
X18A8	X1908	X1968	X19C8	X1A28	X1A88	X1AE8	X1B48	SPSYN1	In spindle synchronization
X18A9	X1909	X1969	X19C9	X1A29	X1A89	X1AE9	X1B49	FSPRV	Spindle rotation speed synchronization completion
X18AA	X190A	X196A	X19CA	X1A2A	X1A8A	X1AEA	X1B4A	FSPPH	Spindle phase synchronization completion
X18AB	X190B	X196B	X19CB	X1A2B	X1A8B	X1AEB	X1B4B	SPSYN2	In spindle synchronization 2
X18AC	X190C	X196C	X19CC	X1A2C	X1A8C	X1AEC	X1B4C	SPCMP	Chuck close confirmation
X18AD	X190D	X196D	X19CD	X1A2D	X1A8D	X1AED	X1B4D		Tool spindle synchronization I (Polygon) ON
X18AE	X190E	X196E	X19CE	X1A2E	X1A8E	X1AEE	X1B4E	SPSYN3	In tool spindle synchronization II
X18AF	X190F	X196F	X19CF	X1A2F	X1A8F	X1AEF	X1B4F	SPNCH	Spindle superimposition control: Speed change disabled
X18B1	X1911	X1971	X19D1	X1A31	X1A91	X1AF1	X1B51	SPILE	Spindle superimposition control ON
X18B2	X1912	X1972	X19D2	X1A32	X1A92	X1AF2	X1B52	SPLCR	Spindle superimposition control: Spindle superimposition clamped
X18B3	X1913	X1973	X19D3	X1A33	X1A93	X1AF3	X1B53	PHOVR	Hob axis delay excess
X18B5	X1915	X1975	X19D5	X1A35	X1A95	X1AF5	X1B55	EXOFN	In spindle holding force up
X18B6	X1916	X1976	X19D6	X1A36	X1A96	X1AF6	X1B56	SPOFFA	In spindle holding force up
X18C1	X1921	X1981	X19E1	X1A41	X1AA1	X1B01	X1B61	SVMD	Spindle position control (Spindle/C axis control): C axis mode ON
X18C2	X1922	X1982	X19E2	X1A42	X1AA2	X1B02	X1B62	GO1	Spindle gear selection output 1
X18C3	X1923	X1983	X19E3	X1A43	X1AA3	X1B03	X1B63	GO2	Spindle gear selection output 2
X18C8	X1928	X1988	X19E8	X1A48	X1AA8	X1B08	X1B68		Spindle oscillation in progress
X18CA	X192A	X198A	X19EA	X1A4A	X1AAA	X1B0A	X1B6A	VGHLD	Real-time tuning 1: Speed gain hold-down ON

Device No.									
$1	$2	$3	$4	$5	$6	$7	$8	Abbrev.	Signal name
XC64	XDA4	XEE4	X1024	X1164	X12A4	X13E4	X1524	SF1	S function strobe 1
XC65	XDA5	XEE5	X1025	X1165	X12A5	X13E5	X1525	SF2	S function strobe 2
XC66	XDA6	XEE6	X1026	X1166	X12A6	X13E6	X1526	SF3	S function strobe 3
XC67	XDA7	XEE7	X1027	X1167	X12A7	X13E7	X1527	SF4	S function strobe 4
XC70	XDB0	XEF0	X1030	X1170	X12B0	X13F0	X1530	SF5	S function strobe 5
XC71	XDB1	XEF1	X1031	X1171	X12B1	X13F1	X1531	SF6	S function strobe 6
XC72	XDB2	XEF2	X1032	X1172	X12B2	X13F2	X1532	SF7	S function strobe 7
XC73	XDB3	XEF3	X1033	X1173	X12B3	X13F3	X1533	SF8	S function strobe 8
XCB0	XDF0	XF30	X1070	X11B0	X12F0	X1430	X1570		In spindle-NC axis polygon mode
XCB2	XDF2	XF32	X1072	X11B2	X12F2	X1432	X1572		In spindle-spindle polygon mode
XCB3	XDF3	XF33	X1073	X11B3	X12F3	X1433	X1573		Spindle-spindle polygon synchronization completion

CNC -> PLC

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
R6500	R6550	R6600	R6650	R6700	R6750	R6800	R6850		Spindle command rotation speed input (L)
R6501	R6551	R6601	R6651	R6701	R6751	R6801	R6851		Spindle command rotation speed input (H)
R6502	R6552	R6602	R6652	R6702	R6752	R6802	R6852		Spindle command final data (rotation speed) (L)
R6503	R6553	R6603	R6653	R6703	R6753	R6803	R6853		Spindle command final data (rotation speed) (H)
R6504	R6554	R6604	R6654	R6704	R6754	R6804	R6854		Spindle command final data (12-bit binary) (L)
R6505	R6555	R6605	R6655	R6705	R6755	R6805	R6855		Spindle command final data (12-bit binary) (H)
R6506	R6556	R6606	R6656	R6706	R6756	R6806	R6856		Spindle actual speed (L)
R6507	R6557	R6607	R6657	R6707	R6757	R6807	R6857		Spindle actual speed (H)
R6508	R6558	R6608	R6658	R6708	R6758	R6808	R6858		
R6514	R6564	R6614	R6664	R6714	R6764	R6814	R6864		Optimum acceleration/deceleration estimated inertia ratio [spindle] ▲
R6515	R6565	R6615	R6665	R6715	R6765	R6815	R6865		Optimum acceleration/deceleration parameter group currently selected [spindle] ▲
R6516	R6566	R6616	R6666	R6716	R6766	R6816	R6866		Spindle synchronization phase error /Hob axis delay angle
R6517	R6567	R6617	R6667	R6717	R6767	R6817	R6867		Spindle synchronization Maximum phase error/ Maximum hob axis delay angle
R6518	R6568	R6618	R6668	R6718	R6768	R6818	R6868		Spindle synchronization Phase offset data
R6519	R6569	R6619	R6669	R6719	R6769	R6819	R6869		Spindle synchronization Phase error monitor
R6520	R6570	R6620	R6670	R6720	R6770	R6820	R6870		Spindle synchronization Phase error monitor (lower limit)
R6521	R6571	R6621	R6671	R6721	R6771	R6821	R6871		Spindle synchronization Phase error monitor (upper limit)
R6522	R6572	R6622	R6672	R6722	R6772	R6822	R6872		Spindle synchronization Phase error 1
R6523	R6573	R6623	R6673	R6723	R6773	R6823	R6873		Spindle synchronization Phase error 2
R6525	R6575	R6625	R6675	R6725	R6775	R6825	R6875		Spindle motor load ratio
R6527	R6577	R6627	R6677	R6727	R6777	R6827	R6877		Spindle actual machining time ▲
R6528	R6578	R6628	R6678	R6728	R6778	R6828	R6878		Load monitor I : Spindle cutting torque output value
R6529	R6579	R6629	R6679	R6729	R6779	R6829	R6879		Spindle alarm/warning No.
R6532	R6582	R6632	R6682	R6732	R6782	R6832	R6882		Synchronous tapping Current error width (L)
R6533	R6583	R6633	R6683	R6733	R6783	R6833	R6883		Synchronous tapping Current error width (H)
R6534	R6584	R6634	R6684	R6734	R6784	R6834	R6884		Synchronous tapping Maximum error width (L)
R6535	R6585	R6635	R6685	R6735	R6785	R6835	R6885		Synchronous tapping Maximum error width (H)
R6536	R6586	R6636	R6686	R6736	R6786	R6836	R6886		Synchronous tapping Current error angle (L)
R6537	R6587	R6637	R6687	R6737	R6787	R6837	R6887		Synchronous tapping Current error angle (H)
R6538	R6588	R6638	R6688	R6738	R6788	R6838	R6888		Synchronous tapping Maximum error angle (L)
R6539	R6589	R6639	R6689	R6739	R6789	R6839	R6889		Synchronous tapping Maximum error angle (H)
R6541	R6591	R6641	R6691	R6741	R6791	R6841	R6891		Load monitoring I: Estimated spindle disturbance torque output
R6542	R6592	R6642	R6692	R6742	R6792	R6842	R6892		Load monitoring I: Effective spindle torque output

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R512	R712	R912	R1112	R1312	R1512	R1712	R1912		S code data 1 (L)
R513	R713	R913	R1113	R1313	R1513	R1713	R1913		S code data 1 (H)
R514	R714	R914	R1114	R1314	R1514	R1714	R1914		S code data 2 (L)
R515	R715	R915	R1115	R1315	R1515	R1715	R1915		S code data 2 (H)
R516	R716	R916	R1116	R1316	R1516	R1716	R1916		S code data 3 (L)
R517	R717	R917	R1117	R1317	R1517	R1717	R1917		S code data 3 (H)
R518	R718	R918	R1118	R1318	R1518	R1718	R1918		S code data 4 (L)
R519	R719	R919	R1119	R1319	R1519	R1719	R1919		S code data 4 (H)
R520	R720	R920	R1120	R1320	R1520	R1720	R1920		S code data 5 (L)
R521	R721	R921	R1121	R1321	R1521	R1721	R1921		S code data 5 (H)
R522	R722	R922	R1122	R1322	R1522	R1722	R1922		S code data 6 (L)
R523	R723	R923	R1123	R1323	R1523	R1723	R1923		S code data 6 (H)
R524	R724	R924	R1124	R1324	R1524	R1724	R1924		S code data 7 (L)
R525	R725	R925	R1125	R1325	R1525	R1725	R1925		S code data 7 (H)
R526	R726	R926	R1126	R1326	R1526	R1726	R1926		S code data 8 (L)
R527	R727	R927	R1127	R1327	R1527	R1727	R1927		S code data 8 (H)

PLC -> CNC

Device No.									
1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP	Abbrev.	Signal name
Y1885	Y18E5	Y1945	Y19A5	Y1A05	Y1A65	Y1AC5	Y1B25	GFIN	Gear shift completion
Y1888	Y18E8	Y1948	Y19A8	Y1A08	Y1A68	Y1AC8	Y1B28	SP1	Spindle speed override code 1
Y1889	Y18E9	Y1949	Y19A9	Y1A09	Y1A69	Y1AC9	Y1B29	SP2	Spindle speed override code 2
Y188A	Y18EA	Y194A	Y19AA	Y1A0A	Y1A6A	Y1ACA	Y1B2A	SP4	Spindle speed override code 4
Y188F	Y18EF	Y194F	Y19AF	Y1A0F	Y1A6F	Y1ACF	Y1B2F	SPS	Spindle override method selection
Y1890	Y18F0	Y1950	Y19B0	Y1A10	Y1A70	Y1AD0	Y1B30	GI1	Spindle gear selection code 1
Y1891	Y18F1	Y1951	Y19B1	Y1A11	Y1A71	Y1AD1	Y1B31	GI2	Spindle gear selection code 2
Y1893	Y18F3	Y1953	Y19B3	Y1A13	Y1A73	Y1AD3	Y1B33	EXOBS	Spindle holding force up
Y1894	Y18F4	Y1954	Y19B4	Y1A14	Y1A74	Y1AD4	Y1B34	SSTP	Spindle stop
Y1895	Y18F5	Y1955	Y19B5	Y1A15	Y1A75	Y1AD5	Y1B35	SSFT	Spindle gear shift
Y1896	Y18F6	Y1956	Y19B6	Y1A16	Y1A76	Y1AD6	Y1B36	SORC	Spindle orientation
Y1897	Y18F7	Y1957	Y19B7	Y1A17	Y1A77	Y1AD7	Y1B37		Spindle command invalid
Y1898	Y18F8	Y1958	Y19B8	Y1A18	Y1A78	Y1AD8	Y1B38	SRN	Spindle forward run start
Y1899	Y18F9	Y1959	Y19B9	Y1A19	Y1A79	Y1AD9	Y1B39	SRI	Spindle reverse run start
Y189A	Y18FA	Y195A	Y19BA	Y1A1A	Y1A7A	Y1ADA	Y1B3A	TL1	Spindle torque limit 1
Y189B	Y18FB	Y195B	Y19BB	Y1A1B	Y1A7B	Y1ADB	Y1B3B	TL2	Spindle torque limit 2
Y189C	Y18FC	Y195C	Y19BC	Y1A1C	Y1A7C	Y1ADC	Y1B3C	WRN	Spindle forward run index
Y189D	Y18FD	Y195D	Y19BD	Y1A1D	Y1A7D	Y1ADD	Y1B3D	WRI	Spindle reverse run index
Y189E	Y18FE	Y195E	Y19BE	Y1A1E	Y1A7E	Y1ADE	Y1B3E	ORC	Spindle orientation command
Y189F	Y18FF	Y195F	Y19BF	Y1A1F	Y1A7F	Y1ADF	Y1B3F	LRSL	L coil selection
Y18A2	Y1902	Y1962	Y19C2	Y1A22	Y1A82	Y1AE2	Y1B42		Spindle position control (C axis) Cutting gain L
Y18A3	Y1903	Y1963	Y19C3	Y1A23	Y1A83	Y1AE3	Y1B43		Spindle position control (C axis) Cutting gain H
Y18A5	Y1905	Y1965	Y19C5	Y1A25	Y1A85	Y1AE5	Y1B45	CMOD	Spindle position control (Spindle/C axis control): C axis selection
Y18A6	Y1906	Y1966	Y19C6	Y1A26	Y1A86	Y1AE6	Y1B46	LRSM	M coil selection
Y18A8	Y1908	Y1968	Y19C8	Y1A28	Y1A88	Y1AE8	Y1B48	SWS	Spindle selection
Y18AA	Y190A	Y196A	Y19CA	Y1A2A	Y1A8A	Y1AEA	Y1B4A	SPRR	Spindle rotation reversal
Y18AB	Y190B	Y196B	Y19CB	Y1A2B	Y1A8B	Y1AEB	Y1B4B	SPRS	Spindle rotation direction switch method selection
Y18AF	Y190F	Y196F	Y19CF	Y1A2F	Y1A8F	Y1AEF	Y1B4F	MPCSL	PLC coil changeover
Y18B0	Y1910	Y1970	Y19D0	Y1A30	Y1A90	Y1AF0	Y1B50	SPSY	Spindle synchronization
Y18B1	Y1911	Y1971	Y19D1	Y1A31	Y1A91	Y1AF1	Y1B51	SPPHS	Spindle phase synchronization
Y18B2	Y1912	Y1972	Y19D2	Y1A32	Y1A92	Y1AF2	Y1B52	SPSDR	Spindle synchronization rotation direction
Y18B3	Y1913	Y1973	Y19D3	Y1A33	Y1A93	Y1AF3	Y1B53	SSPHM	Phase shift calculation request
Y18B4	Y1914	Y1974	Y19D4	Y1A34	Y1A94	Y1AF4	Y1B54	SSPHF	Phase offset request
Y18B5	Y1915	Y1975	Y19D5	Y1A35	Y1A95	Y1AF5	Y1B55	SPDRPO	Error temporary cancel
Y18B8	Y1918	Y1978	Y19D8	Y1A38	Y1A98	Y1AF8	Y1B58	SPSYC	Spindle synchronization/ superimposition cancel
Y18B9	Y1919	Y1979	Y19D9	Y1A39	Y1A99	Y1AF9	Y1B59	SPCMPC	Chuck close
Y18BF	Y191F	Y197F	Y19DF	Y1A3F	Y1A9F	Y1AFF	Y1B5F	SPOFF	Spindle Off Request
Y18C8	Y1928	Y1988	Y19E8	Y1A48	Y1AA8	Y1B08	Y1B68		Spindle oscillation command
Y18C9	Y1929	Y1989	Y19E9	Y1A49	Y1AA9	Y1B09	Y1B69	WGTSC	Spindle control : Coil changeover gate cutoff timer interruption ▲
Y18CA	Y192A	Y198A	Y19EA	Y1A4A	Y1AAA	Y1B0A	Y1B6A	VGHLDC	Real-time tuning 1: Speed control gain hold-down command

PLC -> CNC

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
YCD1	YE11	YF51	Y1091	Y11D1	Y1311	Y1451	Y1591		Spindle-spindle polygon cancel
YCD2	YE12	YF52	Y1092	Y11D2	Y1312	Y1452	Y1592		Synchronized tapping command polarity reversal
YCD3	YE13	YF53	Y1093	Y11D3	Y1313	Y1453	Y1593		Spindle OFF mode
YCE1	YE21	YF61	Y10A1	Y11E1	Y1321	Y1461	Y15A1		Door open II
YCE2	YE22	YF62	Y10A2	Y11E2	Y1322	Y1462	Y15A2		Door open signal input (spindle speed monitor)
YCE3	YE23	YF63	Y10A3	Y11E3	Y1323	Y1463	Y15A3		Door interlock spindle speed clamp

PLC -> CNC

Device No.									
1stSP	**2ndSP**	**3rdSP**	**4thSP**	**5thSP**	**6thSP**	**7thSP**	**8thSP**	**Abbrev.**	**Signal name**
R7000	R7050	R7100	R7150	R7200	R7250	R7300	R7350		Spindle command rotation speed output (L)
R7001	R7051	R7101	R7151	R7201	R7251	R7301	R7351		Spindle command rotation speed output (H)
R7002	R7052	R7102	R7152	R7202	R7252	R7302	R7352	SLSP	Spindle command selection
R7003	R7053	R7103	R7153	R7203	R7253	R7303	R7353		Optimum acceleration/deceleration parameter group selection [spindle] ▲
R7004	R7054	R7104	R7154	R7204	R7254	R7304	R7354		Spindle target machining time ▲
R7008	R7058	R7108	R7158	R7208	R7258	R7308	R7358		S command override
R7009	R7059	R7109	R7159	R7209	R7259	R7309	R7359		Multi-point orientation position data
R7016	R7066	R7116	R7166	R7216	R7266	R7316	R7366		Spindle synchronization Reference spindle selection
R7017	R7067	R7117	R7167	R7217	R7267	R7317	R7367		Spindle synchronization synchronized spindle selection
R7018	R7068	R7118	R7168	R7218	R7268	R7318	R7368		Spindle synchronization Phase shift amount
R7020	R7070	R7120	R7170	R7220	R7270	R7320	R7370		Spindle oscillation amplitude
R7021	R7071	R7121	R7171	R7221	R7271	R7321	R7371		Spindle oscillation frequency

Device No.									
$1	**$2**	**$3**	**$4**	**$5**	**$6**	**$7**	**$8**	**Abbrev.**	**Signal name**
R2567	R2767	R2967	R3167	R3367	R3567	R3767	R3967		Encoder selection

3

Other Devices

In addition to X, Y and R devices described above, the following devices exist:

Name	Symbol	Description
Internal relay Latch relay	M F L	(1) Internal and latch relays are auxiliary relays in the sequence that cannot directly be output to the external. (2) The latch relay L will be backed up even if the power is turned OFF. (3) The internal relay F may be used as the interface for the alarm message display.
Timer	T ST	(1) Timers T are count-up timers. (2) Timer T and ST can set the timer value from either the sequence program or setting and display unit. (3) The 100ms, 10ms and 100ms integral timer are available.
Counter	C	(1) Counters C are count-up counters. (2) Counter C can set the counter value from either the sequence program or setting and display unit.
Data register	D	(1) The data register stores sequence data. (2) One data register consists of 16 bits and can be read or written in 16-bit units. To handle 32-bit data, two data registers are used. The data register addressed by a 32-bit command is used as the low-order 16 bits; the data register addressed by the specified data register number +1 is used as the high-order 16 bits.
File register	R	(1) The file register release area can be used in the same manner as the data register. (2) To handle 32-bit data, two file registers are used. The file register addressed by a 32-bit command is used as the low-order 16 bits; the file register addressed by the specified file register number +1 is used as the high-order 16 bits.

The assignment tables are on the following pages. Copy and use them as necessary.

<Format>

Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Device	Abbreviation	Signal name	Device	Abbreviation	Signal name
Device	Abbreviation	Signal name	Device	Abbreviation	Signal name

4

Explanation of Interface Signals

4.1 PLC Input Signals (Bit Type: X***)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	BOARD RESET	BRST	X2F0

[Function]

This signal indicates that the NC keyboard or the soft keyboard reset button is pressed.

[Operation]

When the NC keyboard or the soft keyboard reset button is pressed, this signal turns ON; and then it turns OFF after 10ms.

NC will not be reset even if this signal is turned ON. In order to reset the NC, check the status of this signal with ladder, and turn NC reset (NRST1), etc. ON/OFF.

[Related signals]

(1) NC reset 1 (NRST1)

(2) NC reset 2 (NRST2)

(3) Reset & rewind (RRW)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	POWER CONSUMPTION COMPUTATION: CONSUMPTION ACCUMULATION ON 1 to 4	IPCEI1 to 4	X700 to 3

[Function]

This signal notifies that "Power consumption computation: Enable consumption accumulation 1 to 4" is ON.

[Operation]

When the "Power consumption computation: Enable consumption accumulation 1 to 4" signal (Y724 or later) is turned ON, this signal turns ON.

When the "Power consumption computation: Enable consumption accumulation 1 to 4" signal (Y724 or later) is turned OFF, this signal turns OFF.

[Related signal]

(1) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4:Y724 to 7)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	POWER OFF PROCESSING		X707

[Function][Operation]

This signal notifies that the power OFF processing is in execution.

This signal is remained ON until the control unit's power is turned OFF.

Refer to the "Automatic power OFF request" signal (Y75D) for details.

0: Not executed

1: During execution

[Related signals]

(1) Automatic power OFF request (Y75D)

(2) Power OFF indication Y device No. (R215)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	POWER CONSUMPTION COMPUTATION: CLEARING CONSUMPTION ACCUMULATION 1 to 4 COMPLETE	IPCCC1 to 4	X708 to B

[Function]

This signal notifies that "Power consumption computation: Clear consumption accumulation 1 to 4" is completed.

[Operation]

When the "Power consumption computation: Clear consumption accumulation 1 to 4" signal (Y700 or later) is turned ON, this signal turns ON.

When the "Power consumption computation: Clear consumption accumulation 1 to 4" signal (Y700 or later) is turned OFF, this signal turns OFF.

[Caution]

(Note 1) When this signal is ON, turn OFF the "Power consumption computation: Clear consumption accumulation 1 to 4" signal (Y700 or later) OFF.

[Related signal]

(1) Power consumption computation: Clear consumption accumulation 1 to 4 (IPCC1 to 4:Y700 to 3)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	BATTERY WARNING	BATWR	X70E

[Function]

This signal notifies that the voltage of the data storage battery in the control device or the battery supplying to the absolute position detector has dropped below the battery alarm detection level.

[Operation]

The signal turns ON when:

(1) The voltage of the data storage battery, which is checked constantly, has dropped below the battery alarm detection level.
The alarm display indicates the system alarm (Z52 0001) at this time.
The alarm display can be turned OFF by reset, but the signal will not be turned OFF.

(2) A fault is detected in the battery voltage supplied to the absolute position detector.
The alarms "Z73 ABS. WARNING 0001" and "S52 SERVO WARNING 009F" are displayed at this time.

Even if this signal is ON, starting the automatic operation is possible.

The signal turns OFF when:

(1) The voltage of the data storage battery drops below the battery alarm detection level, and the battery alarm (BATAL) signal turns ON.
(The system alarm (Z52 0003) is displayed.)

[Caution]

(1) When this signal (X70E) turns ON, replacement of the battery with new one is recommended.

(2) If invalidating the battery alarm/warning detection (#6449 bit4=1), this signal will not turn ON and the alarm messages will not be displayed either.

[Related signals]

(1) Battery alarm (BATAL:X70F)

(2) Battery drop cause (R56)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	BATTERY ALARM	BATAL	X70F

[Function]

This signal notifies that the voltage of the data storage battery in the control device or the battery supplying to the absolute position detector has dropped below the specified value.

[Operation]

The signal turns ON when:

(1) The voltage of the data storage battery is checked when the power is turned ON and is below the battery alarm detection level.
At this time, the alarm "Z52 BATTERY FAULT 0003" will be displayed.

(2) A fault is detected in the battery voltage for the data storage detection circuit.
At this time, the alarm "Z52 BATTERY FAULT 0002" will be displayed.

(3) A fault is detected in the power voltage (battery voltage)(2.6V or less) for the speed detector in the absolute position detector.
At this time, the alarm "Z71 AbsEncoder:Backup voltage drop0001" will be displayed.

(4) The absolute position is lost by the drop in the backup power voltage (battery voltage) in the absolute position detector.
At this time, the alarm "Z70 Abs posn error(servo alm 25) 0101" will be displayed.

When this signal is ON, automatic starting is not possible.

The signal turns OFF when:

(1) For alarms caused by ON condition (1), the signal can be turned OFF by resetting after the battery is replaced with new one.

(2) For alarms caused by ON conditions (2) and (3), the signal can be turned OFF by removing the power voltage fault and then turning the power ON again.

[Caution]

(1) If simply turning the control unit power OFF upon occurrence of this battery alarm (especially in the "ON" conditions (1)), data storing machining programs, etc. will be destroyed. Replace the battery with new one before turning the power OFF and confirm that this signal is turned OFF. If this battery alarm has occurred when the control unit power is ON (especially in the "ON" conditions (1)), take measures, assuming that the data storing machining programs may have been destroyed.

(2) If invalidating the battery alarm/warning detection (#6449 bit4=1), this signal will not turn ON or the alarm messages will not be displayed.

(3) Make sure to backup the control unit data and keep it in case that this alarm occurs.

[Related signals]

(1) Battery warning (BATWR: X70E)

(2) Battery drop cause (R56)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	HIGH-SPEED SIMPLE PROGRAM CHECK MODE ON	SMLKO	X712

[Function]

This signal indicates that the high-speed simple program check mode has been entered.

[Operation]

This signal turns ON when the "High-speed simple program check mode" signal (SMLK:Y73E) is input.

[Related signals]

(1) High-speed simple program check mode (SMLK:Y73E)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	HIGH-SPEED SIMPLE PROGRAM CHECK: COORDI-NATE POSITION CHECK ON	SPSCO	X713

[Function]

This signal informs that the coordinate position check is enabled during the high-speed simple program check.

[Operation]

This signal turns ON when the "High-speed simple program check: Enable coordinate position check" signal (Y76B) is ON.

This signal turns OFF when the "High-speed simple program check: Enable coordinate position check" signal (Y76B) is OFF.

[Related signals]

(1) High-speed simple program check mode (SMLK:Y73E)

(2) High-speed simple program check mode ON (SMLKO:X712)

(3) High-speed simple program check: Enable coordinate position check (SPSC:Y76B)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Manual arbitrary reverse run mode ON	PCHKO	X715

[Function]

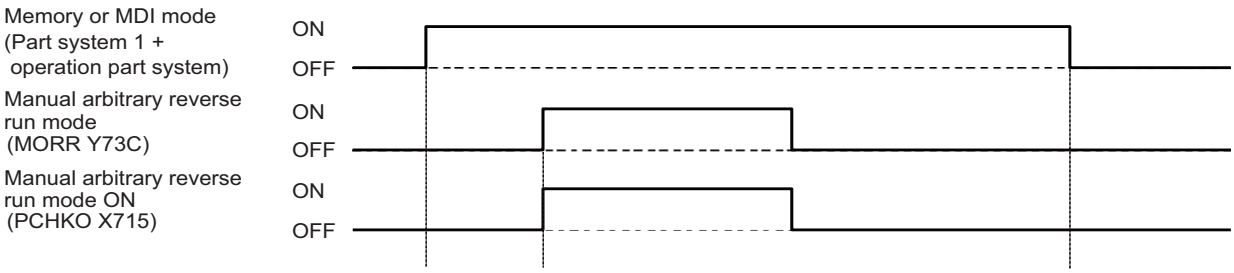
This signal informs that the manual arbitrary reverse run mode is in operation.

[Operation]

This signal is turned ON while the manual arbitrary reverse run mode is in operation.

This signal is turned OFF when the manual arbitrary reverse run mode is cancelled.

[Operation sequence]



[Related signals]

(1) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)

(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)

(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)

(4) Manual arbitrary reverse run mode (MORR:Y73C)

(5) Manual arbitrary reverse run speed selection (MORSP:Y73D)

(6) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)

(7) Manual arbitrary reverse run: MSTB reverse run prohibited (RBSSY:YCF1)

(8) Manual arbitrary reverse run: Reverse run block stop designated part system (MRPSG:YCFC)

(9) Manual arbitrary reverse run handle selection (R375)

(10) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MANUAL ARBITRARY REVERSE RUN: REVERSE RUN ON	MOREV	X716

[Function]

This signal indicates the forward/reverse status during the manual arbitrary reverse run.

[Operation]

This signal turns ON when reverse run is performed during the manual arbitrary reverse run.

This signal is OFF during forward run.

[Related signals]

(1) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)

(2) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)

(3) Manual arbitrary reverse run mode (MORR:Y73C)

(4) Manual arbitrary reverse run speed selection (MORSP:Y73D)

(5) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)

(6) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG:YCFC)

(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY YCF1)

(8) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	COLLECTING DIAGNOSIS DATA		X723

[Function]

This signal informs that collecting history data is being executed by the operation history function.

[Operation]

This signal turns ON while collecting history data is executed.

[Related signals]

(1) Collecting diagnosis data stop (Y72B)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	IN REMOTE PROGRAM INPUT		X724
A	REMOTE PROGRAM INPUT COMPLETION		X725
A	REMOTE PROGRAM INPUT ERROR		X726

[Function][Operation]

Refer to the section on "Remote program input start" signal for the function and operation.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Remote program input error information (R30)

(2) Remote program input start (Y76C)

(3) Remote program input No. (R352,R353)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	IN TOOL ID COMMUNICATION		X727

[Function]

This signal indicates that data transmission and reception with the tool ID controller are executed.

[Operation]

This signal turns ON during commanding to write and read the tool ID data, and turns OFF after the transmission and reception with the tool ID controller is completed.

For whether transmission and reception have normally completed or not, refer to the "Tool ID communication error information".

[Caution]

(1) Even if the "Reset" signal is turned ON during the tool ID communication, the communication is not stopped.

(2) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Tool ID communication error information (R62)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus/TCP COMMUNICATING	MDBUSIF	X728

[Function]

This signal notifies that the connection to Modbus/TCP master station is completed.

[Operation]

This signal turns ON when more than one connection to Modbus/TCP master station is established.

This signal turns OFF when the connection is reset and there is no master station to connect.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus TIME-OUT 1	MDBUSER1	X729

[Function]

This signal notifies that the communication remains idle for a given amount of time after communicating to Modbus/TCP master station is completed.

[Operation]

This signal detects the time-out and turns ON when the connection to Modbus/TCP master station was established and data was received but the next one is not received for longer than the timeout period.

When the time-out is detected, the device in the transfer block that the Modbus/TCP clear is valid is cleared and that block's transfer stops.

Once the signal is turned ON, it will not turn OFF until "Modbus Time-out 1 cancel" signal (MDBUSRST2) is turned ON or the power is turned ON again.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus TIME-OUT 2	MDBUSER2	X72A

[Function]

This signal notifies that the communication from Modbus/RTU master station remains idle for a given amount of time.

[Operation]

This signal detects the time-out and turns ON if the next data is not received for longer than the timeout period after the data was received from Modbus RTU master station.

When the time-out is detected, the device in the transfer block that the Modbus/RTU clear is valid is cleared and that block's transfer stops.

Once the signal is turned ON, it will not turn OFF until "Modbus Time-out 2 cancel" signal (MDBUSRST2) is turned ON or the power is turned ON again.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	POWER OFF REQUIRED AFTER PARAMETER CHANGE		X72F

[Function]

This signal informs that the set parameter is not valid without rebooting the power.

[Operation]

When the following operation is executed, the "Power OFF required after parameter change" signal is output, and the display symbol "PR" is displayed in the operation status section.

(1) The parameters to be valid after rebooting the power are set. / Such parameter data is input.
(2) The auxiliary axis parameters to be valid after rebooting the power are set. / Such data is input. / Such data backed up before is input.
(3) The maintenance data for the ALL1 is input.
(4) The backup data is input with the SRAM backup function.

If the power is rebooted, the "Power OFF required after parameter change" signal will turn OFF, and the "PR" display will disappear.

(Note 1) Even if the same value is set to the parameter which needs to reboot the power, the "Power OFF required parameter change" signal is output, and the "PR" is displayed.

(Note 2) Even if the value is returned to the original value after setting the parameter which needs to reboot the power, the "Power OFF required after parameter change" signal remains ON, and the "PR" also remains displayed.

(Note 3) The parameters which do not need to reboot the power are targeted for rewriting the parameters with DDB or G10, so the "Power OFF required after parameter change" signal is not output, and the "PR" is not displayed.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	THREAD, TAP BLOCK STOPPING IN MANUAL ARBI-TRARY REVERSE RUN	MBSTP	X74D

[Function]

This signal notifies the PLC that a block stop occurred before moving to thread cutting or tapping during the manual arbitrary reverse run.

[Operation]

When the "Actual cutting mode (thread, tap) in manual arbitrary reverse run" signal (MRCMD) is ON, a block stop occurs before moving to thread cutting and tapping.

This signal turns ON when this block stop occurs.

If automatic start is executed in this state, thread cutting and tapping start and this signal turns OFF.

[Related signals]

(1) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)
(2) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)
(3) Manual arbitrary reverse run mode (MORR:Y73C)
(4) Manual arbitrary reverse run speed selection (MORSP:Y73D)
(5) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)
(6) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG:YCFC)
(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY YCF1)
(8) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	THREAD, TAP REVERSE RUN PROHIBITION ALARM IN MANUAL ARBITRARY REVERSE RUN	MRVNG	X74E

[Function]

This signal notifies the PLC that the reverse run prohibition alarm occurred at the thread cutting or tapping block during the manual arbitrary reverse run.

[Operation]

If the "Actual cutting mode (thread, tap) in manual arbitrary reverse run" signal (MRCMD) is ON, the thread cutting and tapping blocks are not executed when reverse run is performed.

This reverse run prohibition alarm turns ON at these blocks.

The alarm signal is kept ON and turned OFF when forward run is executed.

[Related signals]

(1) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)
(3) Manual arbitrary reverse run mode (MORR:Y73C)
(4) Manual arbitrary reverse run speed selection (MORSP:Y73D)
(5) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)
(6) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG:YCFC)
(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY YCF1)
(8) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	24 HOURS CONTINUOUS OPERATION	CNOP	X752

[Function]

This signal notifies that the connector status of the drive power has been ON for over 24 hours.

[Operation]

This signal turns OFF when the contactor shutoff is confirmed by the contactor shutoff test.

Turn the "contactor shutoff test" signal ON to carry out this test.

[Caution]

There is a possibility that the contactor is welded and so your safety may not be secured when "24 hours continuous operation" signal is output. Thus, under this condition, do not input "speed monitor mode" signal to open the door.

[Related signals]

(1) Contactor shutoff test (MCT:Y742)

(2) Speed monitor mode (SOMD:R296)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	PALLET PROGRAM REGISTRATION EXT. WORKPIECE COORDINATE TRANSFER COMPLETION		X758

[Function][Operation]

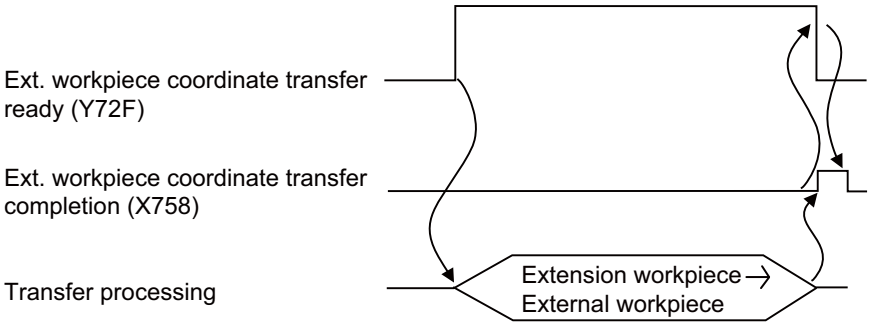
Completion of transfer from extension workpiece coordinate to external workpiece coordinate offset (EXT) during pallet 4 page registration is displayed.

This signal turns ON at the completion of transfer processing.

This signal turns OFF when external workpiece coordinate transfer ready is turned OFF.

The transferred external workpiece coordinate offset (EXT) will be effective as soon as when this signal is turned ON.

[Timing chart]


Ext. workpiece coordinate transfer ready (Y72F)
Ext. workpiece coordinate transfer completion (X758)
Transfer processing
Extension workpiece → External workpiece

[Related signals]

(1) Pallet program registration Ext. workpiece coordinate transfer ready (Y72F)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	$1 to $8 DISPLAY		X760 to 7

[Function]

This signal indicates the part system displayed on the screen.

[Operation]

This signal turns ON when the part-system display has been changed by pressing the $<=>$ key, by turning ON the "Display changeover $1 to $8" signal (DISP1 to 8), or with the touchscreen.

[Related signals]

(1) Display changeover $1 to $8 (DISP1 to 8: Y730 to 737)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZING MODE	GBMOD	X778

[Function]

This signal notifies that the guide bushing (G/B) spindle synchronization mode is in execution.

[Operation]

This signal is ON while the G/B spindle synchronization valid (GBON) is ON.

This signal turns OFF at an emergency stop or when the G/B spindle synchronization: temporary cancel (GBOFF) turns ON.

[Related signals]

(1) G/B spindle synchronization valid (GBON: Y778)

(2) G/B spindle synchronization: temporary cancel (GBOFF: Y77D)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: POSITION CON-TROL SYNCHRONIZING	GBSYN	X779

[Function]

This signal notifies that the reference spindle and the guide bushing (G/B) spindle are in the spindle synchronization state.

[Operation]

This signal is ON while the reference spindle and the guide bushing spindle are in the spindle synchronization state.

This signal turns OFF at an emergency stop or when the G/B spindle synchronization: temporary cancel (GBOFF) turns ON.

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)

(2) G/B spindle synchronization: temporary cancel (GBOFF: Y77D)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B spindle synchronization: phase alignment complete	GBPHF	X77A

[Function]

This signal notifies that the phase alignment of the reference spindle and the guide bushing (G/B) spindle is completed.

[Operation]

This signal turns ON when the phase alignment of the phase gap (relative position) of the reference spindle and the guide bushing spindle that has been saved is completed.

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)

(2) G/B spindle synchronization: phase alignment (GBPHS:Y77A)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B spindle synchronization: position error compensating	GBPCM	X77B

[Function]

This signal notifies that guide bushing (G/B) spindle synchronization position error compensation is in execution.

[Operation]

This signal turns ON when the guide bushing spindle synchronization position error compensation becomes in execution and when refreshing the compensation amount is completed to be repeated by the number of times set in R390 (Guide bushing spindle synchronization position error compensation scale and the number of times of compensations).

This signal turns OFF:

- When both G/B spindle synchronization: keep position error compensation amount (GBCMKP) and the G/B spindle synchronization: position error compensation (GBCMON) are turned OFF
- When the guide bushing spindle synchronization mode is canceled
- During measuring the guide bushing spindle synchronization position error compensation amount.

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)
(2) G/B spindle synchronization: position error compensation (GBCMON:Y77C)
(3) G/B spindle synchronization: keep position error compensation amount (GBCMKP:Y77E)
(4) G/B spindle synchronization: position error compensation scale and the number of times of compensations (R390)
(5) G/B spindle synchronization: position error compensation amount (R465)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	SERVO READY n-TH AXIS	RDY1 to 8	X780 to 7	X788 to F	X790 to 7	X798 to F

[Function]

This signal indicates that the drive section of the nth axis is ready for operation.

[Operation]

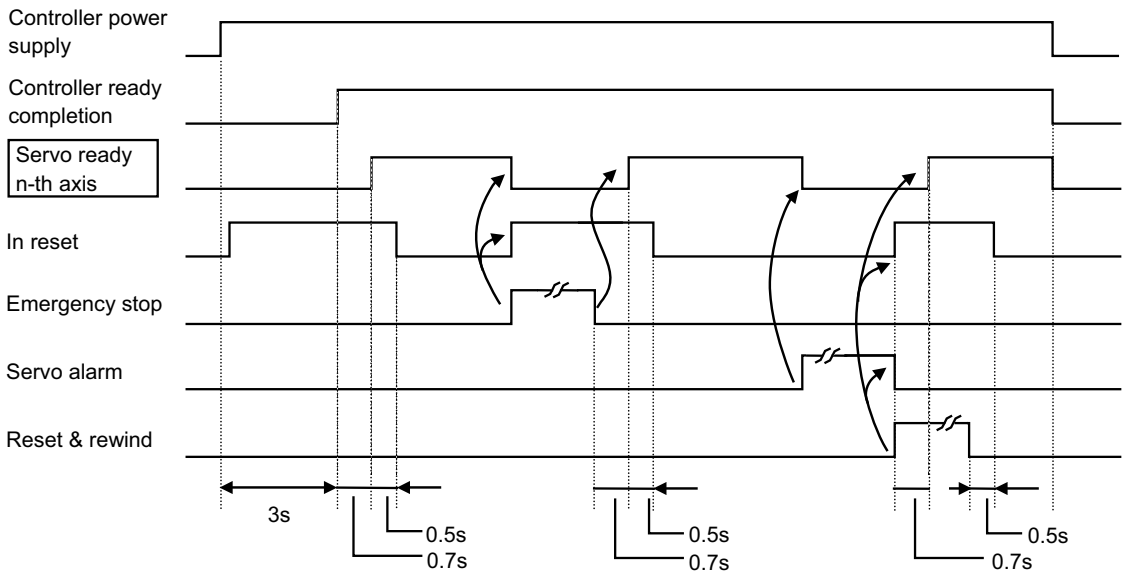
The signal turns ON when:

(1) The power supply of the controller is turned ON and the diagnosis on the servo system has been completed successfully.
(2) Servo alarm has been reset.
(3) Emergency stop has been reset.
(4) "Servo off"(*SVFn) signal is reset.

The signal turns OFF when:

(1) Servo alarm occurs.
(2) Emergency stop is issued.
(3) "Servo off"(*SVFn) signal is input.

[Operation sequence]



[Related signals]

(1) Servo ready completion (SA: XC11)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	AXIS SELECTED n-TH AXIS	AX1 to 8	X7A0 to 7	X7A8 to F	X7B0 to 7	X7B8 to F

[Function]

This signal indicates that motion command is issued to the control axis.

[Operation]

This signal turns ON and OFF as follows:

(1) Automatic operation

The signal is ON while the motion command is issued to the end of movement, or to when automatic operation pause turns ON.

(2) Manual operation

(a) For JOG mode

The signal is ON while "Feed axis selection +/-" (+Jn and -Jn) signal is ON.

(b) For HANDLE mode

When "1st to 3rd handle axis selection code m" (HS1mn to HS3mn) and "Handle valid" signal (HS1Sn, HS2Sn, HS3Sn) have been selected, the "Axis selected" signal for the axis specified by the "1st to 3rd handle axis selection code m" (HS1mn to HS3mn) signal is ON.

(c) For INCREMENTAL mode

The signal turns ON when "Feed axis selection +/-" (+Jn, -Jn) signal turns ON, and turns OFF when the specified motion is completed.

(d) For MANUAL ARBITRARY FEED mode

The signal turns ON when "Manual arbitrary feed strobe" (CXS8n) signal turns ON, and turns OFF when the specified motion is completed.

(e) For REFERENCE POSITION RETURN mode

The signal is ON while "Feed axis selection +/-" (+Jn and -Jn) signal is ON. After "Reference position return near point detection" signal is detected, and the motion speed changes to approach (creeping) speed, the "Axis selected" signal remains ON until the motion stops at the reference position, even when "Feed axis selection +/-" (+Jn and -Jn) signal turns OFF.

(3) Other conditions

(a) The signal can turn ON even during machine lock (Z-axis is in cancellation). However, it does not turn ON during machine lock in manual operation mode.

(b) The signal remains on even when motion stops due to feedrate override set at 0%, manual control feedrate set at 0 mm/min, or 0 inch/min.

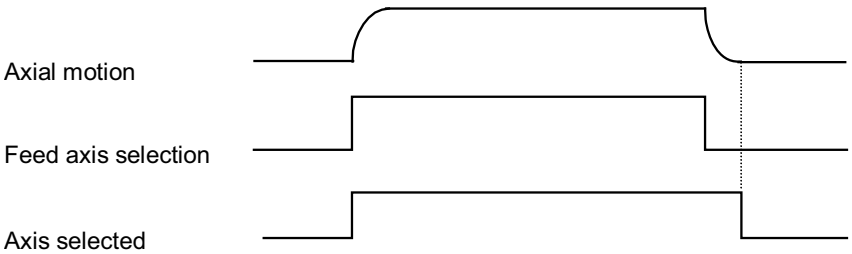
(c) Interlock does not affect status of this signal (the signal remains ON, or turns ON).

(d) "Servo off" signal does not affect status of this signal.

(e) The signal cannot be turned ON by G04 and G92.

(f) The signal turns OFF with "controller Reset & Rewind", or "Emergency stop".

(Example)



Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	IN AXIS PLUS MOTION n-TH AXIS	MVP1 to 8	X7C0 to 7	X7C8 to F	X7D0 to 7	X7D8 to F

[Function]

This signal indicates that the specified axial motion is in plus (+) direction.

This signal is available per control axis, and the last number of the signal name indicates the control axis No.

[Operation]

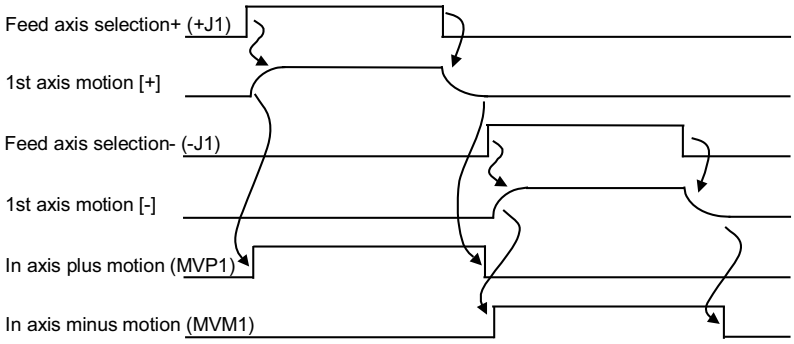
The signal turns ON when:

(1) The specified axial component starts moving in the plus direction or when moving.

The signal turns OFF when:

(2) The specified control axis stops moving or moves in the minus direction.

An example of the timing chart for the jog mode is shown below.


Feed axis selection+ (+J1)
1st axis motion [+]
Feed axis selection- (-J1)
1st axis motion [-]
In axis plus motion (MVP1)
In axis minus motion (MVM1)

(Note 1) This signal operates regardless of the operation mode.

(Note 2) The real movement direction is indicated.

(Note 3) The signal does not turn ON during machine lock.

[Related signals]

(1) In axis minus motion n-th axis (MVM1 to 8: X7E0 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	IN AXIS MINUS MOTION n-TH AXIS	MVM1 to 8	X7E0 to 7	X7E8 to F	X7F0 to 7	X7F8 to F

[Function]

This signal indicates that the control axis is moving in the minus direction

[Operation]

This motion direction is the reverse of the plus motion, and the operation is the same as IN AXIS PLUS MOTION + (MVPn).

[Related signals]

(1) In axis plus motion n-th axis (MVP1 to 8: X7C0 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	1ST REFERENCE POSITION REACHED n-TH AXIS	ZP11 to 18	X800 to 7	X808 to F	X810 to 7	X818 to F

[Function]

This signal indicates that the axial component of the nth axis is ON the 1st reference position.
Each control axis is provided with this signal. The last number (n = 1, 2, 3...) of the signal abbreviation indicates the control axis No.

[Operation]

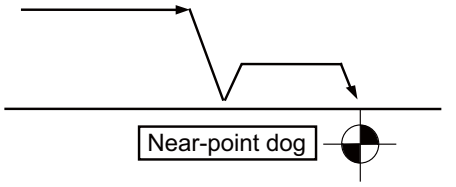
(1) The signal turns ON when:
- "1st reference position reached" is attained with reference position return mode in manual operation.
  Refer to the REFERENCE POSITION RETURN (ZRNn) section for details on returning.
- "1st reference position reached" is attained with G28 command in automatic operation.

(Note 1) If "1st reference position reached" is achieved in other operation mode, or by other command, the signal does not turn ON.

(2) The signal turns OFF when:
- The axial component in position is relocated from the 1st reference position by motion command.
- "Emergency stop" signal is input or servo alarm occurs, causing stop to the machine.

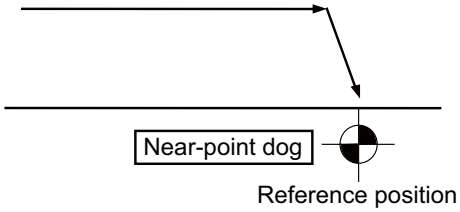
(3) Reference position return operation pattern

○ Dog-type reference position return



- When basic machine coordinate system is not established.
- When dog-type return is selected with setup parameters, basic specification parameter "#1063 mandog" in the manual mode.

○ High-speed reference position return



- When basic machine coordinate system is established.
- When high-speed return is selected with setup parameters, basic specification parameter "#1063 mandog" in the manual mode.

(Note)
Reference position return will be the high-speed return when the basic machine coordinate system is established (2nd time and following).

[Related signals]

(1) 2nd reference position reached n-th axis (ZP21 to 28: X820 to 7)
(2) 3rd reference position reached n-th axis (ZP31 to 38: X840 to 7)
(3) 4th reference position reached n-th axis (ZP41 to 48: X860 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	2ND REFERENCE POSITION REACHED n-TH AXIS	ZP21 to 28	X820 to 7	X828 to F	X830 to 7	X838 to F

[Function]

This signal indicates that the axial component of the nth axis is on the 2nd reference position.
Each control axis is provided with this signal. The last number (n = 1, 2, 3...) of the signal abbreviation indicates the control axis No.

[Operation]

(1) The signal turns ON when:
- "2nd reference position reached" is attained with G30 command (G30 P2) in automatic operation.
- "2nd reference position reached" is attained with reference position retern mode of automatic operation (Reference position selection code 1, 2).

(Note) If "2nd reference position reached" is achieved in other operation mode, or by other command, the signal does not turn ON.

(2) The signal turns OFF when:
- The axial component in position is relocated from the 1st reference position by motion command.
- "Emergency stop" signal is input or servo alarm occurs, causing stop to the machine.

[Related signals]

(1) 1st reference position reached n-th axis (ZP11 to 18: X800 to 7)
(2) 3rd reference position reached n-th axis (ZP31 to 38: X840 to 7)
(3) 4th reference position reached n-th axis (ZP41 to 48: X860 to 7)
(4) Reference position selection code m (ZSLmn: YC190,1)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	3RD REFERENCE POSITION REACHED n-TH AXIS	ZP31 to 38	X840 to 7	X848 to F	X850 to 7	X858 to F

[Function][Operation]

This signal informs that the control axis is on the 3rd reference position.
Function and operation are the same as the 2nd reference position reached, but the reference position and G command are different.
- Reference position: 3rd reference position
- G comand: G30 P3

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	4TH REFERENCE POSITION REACHED n-TH AXIS	ZP41 to 48	X860 to 7	X868 to F	X870 to 7	X878 to F

[Function][Operation]

This signal informs that the control axis is on the 4th reference position.
Function and operation are the same as the 2nd reference position reached, but the reference position and G command are different.
- Reference position: 4th reference position
- G comand: G30 P4

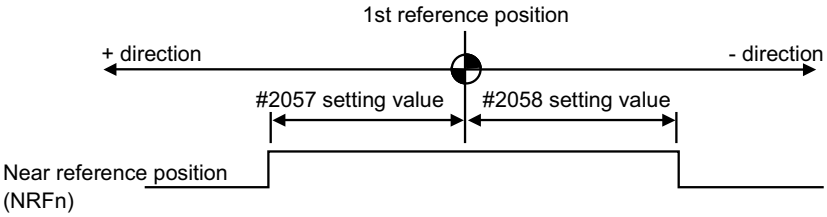
Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	NEAR REFERENCE POSITION n-TH AXIS	NRF1 to 8	X880 to 7	X888 to F	X890 to 7	X898 to F

[Function]

This signal indicates that the control axis is near the 1st reference position in the absolute position detection system.

[Operation]

This signal turns ON when the control axis is in the range of the parameter set using the 1st reference position as a base point, and turns OFF when the range is exceeded. The parameter is set with #2057 (nrefp) and #2058 (nrefn) in the [ABS. POSI PARAM] screen.



(Note 1) The "Near reference position" signal is output even while the axis is moving, but there may be deviation with the actual machine position.
Rapid traverse: Approx. 19mm at 20m/min.
Cutting feed: Approx. 9.5mm at 10m/min.

(Note 2) This signal is valid only with the absolute position detection system.

(Note 3) When 0 is set for #2057 (nrefp) and #2058 (nrefn) in the [ABS. POSI PARAM] screen, it will be same as when the grid width is set.

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	ARBITRARY AXIS SUPERIMPOSITION COMPLETE N-TH AXIS	PLFN1 to 8	X8A0 to 7	X8A8 to F	X8B0 to 7	X8B8 to F

[Function]

This signal indicates that which axis is controlled as the superimposition axis during the arbitrary axis superimposition control.

0: Axis not in the arbitrary axis superimposition control

1: Axis in the arbitrary axis superimposition control

[Operation]

This signal turns ON when the arbitrary axis superimposition control is established after the arbitrary axis superimposition control "start" is commanded.

This signal turns OFF when the arbitrary axis superimposition control "end" is commanded.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	ZERO POINT INITIALIZATION SET COMPLETED n-TH AXIS	ZSF1 to 8	X8C0 to 7	X8C8 to F	X8D0 to 7	X8D8 to F

[Function]

This signal notifies that the basic machine coordinate system has been set (established) during zero point initialization set using the marked point alignment method in the absolute position detection system.

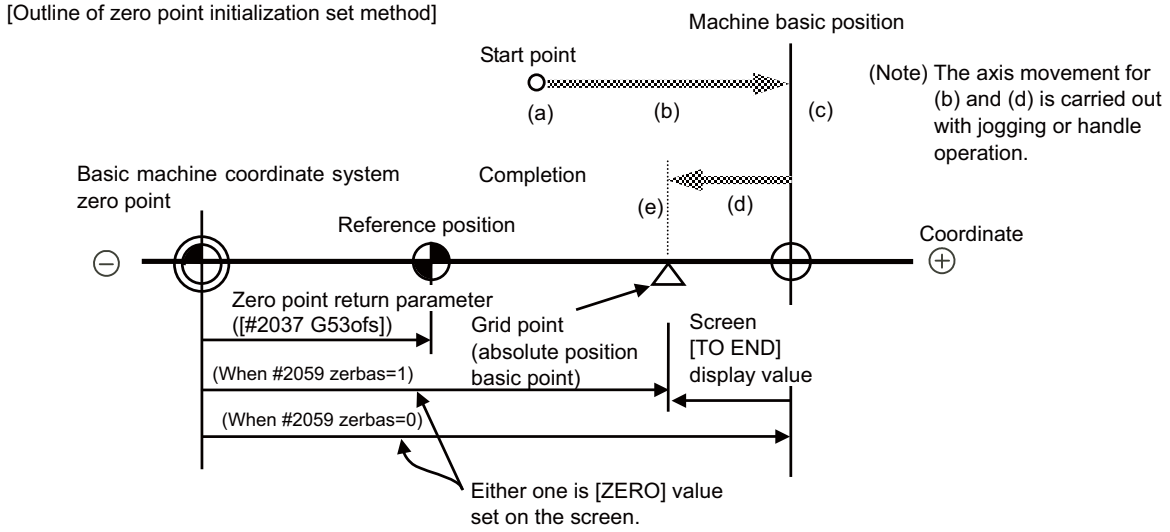
[Operation]

This signal is valid when "#2049 TYPE" on the [ABS. POSI PARAM] screen is set to "2", and turns ON when the basic machine coordinate system is set (established).

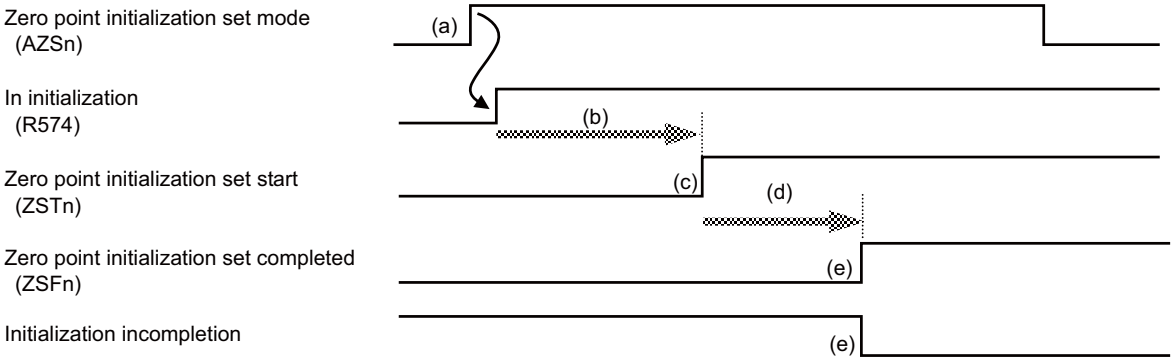
This signal will turn OFF if initializing is carried out again or if the power is turned ON again.

<Zero point initialization set method using marked point alignment method, and timing chart>

[Outline of zero point initialization set method]



[Time chart] ((a) to (e) in the figure correspond to (a) to (e) above)



[Related signals]

(1) Zero point initialization set error completed (ZSE1 to 8: X8E0 to 7)
(2) In initialization (R574)
(3) Initialization incompletion (R575)
(4) Zero point initialization set mode (AZS1 to 8: Y960 to 7)
(5) Zero point initialization set start (ZST1 to 8: Y980 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	ZERO POINT INITIALIZATION SET ERROR COMPLETED n-TH AXIS	ZSE1 to 8	X8E0 to 7	X8E8 to F	X8F0 to 7	X8F8 to F

[Function]

This signal is output when initializing is not possible during the marked point alignment method of the absolute position detection system.

[Operation]

This signal turns ON when the initializing is not possible at the rising edge of the "Zero point initialization set start" (ZSTn) signal.

This signal is invalidated in the following cases:

- During emergency stop
- During reset
- When "Zero point initialization set start" (ZSTn) signal is turned ON before the "Zero point initialization set mode" (AZSn) signal
- When grid has not been passed even once after the power has been turned ON. (Depends on the detector type)

[Related signals]

(1) Zero point initialization set completed (ZSF1 to 8: X8C0 to 7)
(2) In initialization (R574)
(3) Initialization incompletion (R575)
(4) Zero point initialization set mode (AZS1 to 8: Y960 to 7)
(5) Zero point initialization set start (ZST1 to 8: Y980 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	IN CURRENT LIMIT n-TH AXIS	ILI1 to 8	X900 to 7	X908 to F	X910 to 7	X918 to F

[Function][Operation]

This signal turns ON during the current limit.

[Related signals]

(1) Current limit reached n-th axis (ILA1 to 8: X920 to 7)
(2) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to 7)
(3) Droop release request n-th axis (DOR1 to 8: Y9C0 to 7)
(4) Current limit mode 1,2 (ILM1,2: YCC0,1)
(5) Current limit changeover (R2593)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	CURRENT LIMIT REACHED n-TH AXIS	ILA1 to 8	X920 to 7	X928 to F	X930 to 7	X938 to F

[Function][Operation]

This signal turns ON when the current reaches its limit during the current limit control.

[Related signals]

(1) In current limit n-th axis (ILI1 to 8:X900 to 7)
(2) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to 7)
(3) Droop release request n-th axis (DOR1 to 8: Y9C0 to 7)
(4) Current limit mode 1,2 (ILM1,2: YCC0,1)
(5) Current limit changeover (R2593)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	NC AXIS UP-TO-SPEED n-TH AXIS	ARRFn	X940 to 7	X948 to F	X950 to 7	X958 to F

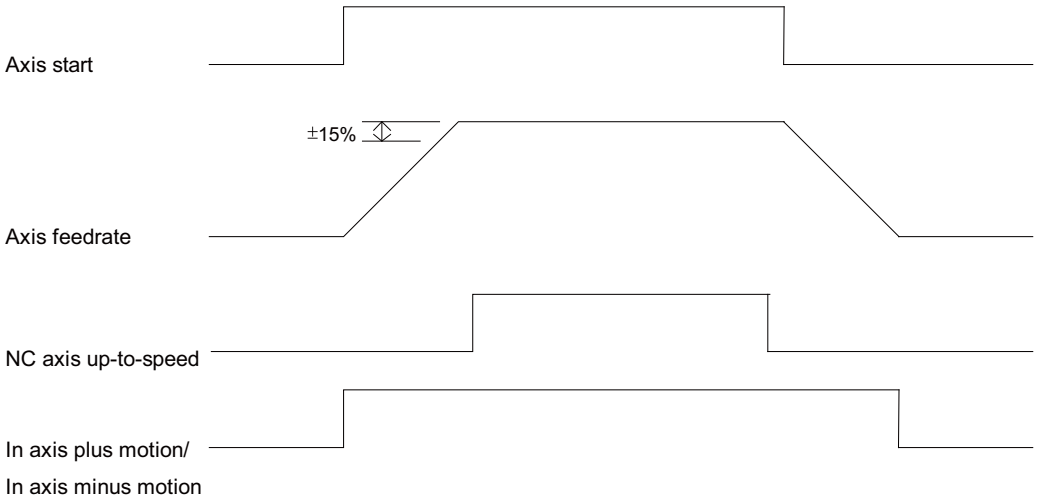
[Function]

This signal indicates that the actual axis feedrate has reached the feedrate commanded for each axis.

[Operation]

This signal turns ON when the difference of the speed commanded for each axis and the motor feedback feedrate is within a set range (approx. ±15%).

This signal turns OFF when the speed difference exceeds the set range.



[Related signals]

(1) In axis plus motion n-th axis (MVP1 to 8: X7C0 to 7)

(2) In axis minus motion n-th axis (MVM1 to 8: X7E0 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	UNCLAMP COMMAND n-TH AXIS	UCLPn	X960 to 7	X968 to F	X970 to 7	X978 to F

[Function]

This signal is output when movement of the axis selected as the index table indexing axis is commanded.

[Operation]

When this signal turns ON, the index table indexing axis clamp is released by the ladder, and the "unclamp completion" (UCLPFn) signal is set.

This signal turns OFF when movement of the index table indexing axis is completed.

The signal turns ON when:

- Movement of the indexing axis is commanded during automatic operation.

This signal turns OFF when:

- Movement of the indexing axis is completed during automatic operation.
- The axis movement is forcibly ended with reset or emergency stop, etc.

(Note 1) The index command will not turn OFF if the axis movement is interrupted with an interlock or automatic operation pause, etc.

(Note 2) This signal is turned ON and OFF when the index table indexing axis acceleration/deceleration has completed. Thus, if the in-position has to be confirmed during the clamp/unclamp operation, confirm with the PLC.

[Related signals]

(1) Unclamp completion (UCLPFn:YA20 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	IN MIXED CONTROL (CROSS AXIS CONTROL) n-TH AXIS		X980 to 7	X988 to F	X990 to 7	X998 to F

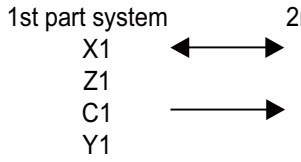
[Function]

This signal is a status signal that indicates a state commanded by the "mixed control(cross axis control) request" signal.

[Operation]

The axis in the in mixed control(cross axis control) is "1".

(Example)



(1) Mixed control (cross axis control) between X1 and X2:
X980 and X988 are "1".
(2) When C1 is controlled in 2nd part system:
X982 and X98A are "1".

[Related signals]

(1) Mixed control (cross axis control) request n-th axis (YA60 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	IN SYNCHRONOUS/ SUPERIMPOSITION CONTROL n-TH AXIS		X9A0 to 7	X9A8 to F	X9B0 to 7	X9B8 to F

[Function]

This signal informs the axis in the control axis synchronization across part systems/superimposition control.

0: Axis not in control axis synchronization across part systems/superimposition control

1: Axis in control axis synchronization across part systems/superimposition control

[Operation]

The synchronized axis/superimposed axis and synchronized reference axis/superimposed reference axis are indicated.

[Note]

(1) Since the control axis synchronization function across part systems and the control axis superimposition control function cannot be used simultaneously, when this signal is set to "1", it indicates that the axis is either in synchronization control or superimposition control at all times.

[Related signals]

(1) Synchronous control request n-th axis (YA80 to F)
(2) Superimposition control request n-th axis (YAA0 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	IN MIRROR IMAGE n-TH AXIS	MIRn	X9C0 to 7	X9C8 to F	X9D0 to 7	X9D8 to F

[Function]

This signal indicates that a control axis is in mirror image.

There is a signal for each control axis. The last digit in the signal name indicates the control axis No.

[Operation]

The signal turns ON during:

(1) Programmable mirror image
(2) Parameter setting mirror image
(3) External input mirror image
(4) Facing turret mirror image

The signal turns OFF when:

(1) The mirror image above is canceled.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	REFERENCE POSITION ESTABLISHMENT n-TH AXIS		X9E0 to 7	X9E8 to F	X9F0 to 7	X9F8 to F

[Function]

This signal indicates that a reference position is established.

There is a signal for each control axis. The last digit in the signal name indicates the control axis No.

[Operation]

The signal turns ON when:

(1) Manual reference position return is completed and a reference position is established.

(2) A reference position is confirmed by the absolute position detector when the power is turned ON.

The signal turns OFF when:

(1) The reference position is lost

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	REFERENCE POSITION RETURN DIRECTION n-TH AXIS		XA00 to 7	XA08 to F	XA10 to 7	XA18 to F

[Function]

This signal indicates that whether the reference position selected by "Reference position selection code 1,2" or "Each axis reference position selection" is in the plus direction or minus direction with respect to the current position.

[Operation]

The signal turns ON when:

(1) The reference position selected by "Reference position selection code 1,2" (ZSL1, ZSL2: YC90, YC91) or "Each axis reference position selection" (R2584) is in the minus direction while reference position is established.

The signal turns OFF when:

(1) The reference position is in the plus direction.

(2) The current position is on the reference position

(3) The reference position is lost

(Note 1) If the rotation axis type is other than all coordinate linear type, this signal turns ON when $0°<\theta \leqq 180°$, and turns OFF when $180°<\theta \leqq 360°(0°)$.

(Note 2) "Reference position return direction" signal is not output for the reference position commanded by the machining program in an automatic operation.

(Note 3) "Reference position selection code 1,2" and "Each axis reference position selection" hold the state of the reference position return start in the reference position return mode.

(Note 4) When the zero point is changed during reference position return while "Reference position selection code 1,2" is valid, the "Reference position return direction" is output to the zero point prior to the change.

(Note 5) When the zero point is changed during reference position return while "Each axis reference position selection" is valid, the "Reference position return direction" is output to the zero point after the change.

[Related signals]

(1) Reference position establishment (X9E0 to X9E7)

(2) Reference position selection method (M:YC97)

(3) Reference position selection code 1,2 (ZSL1, 2: YC90, YC91)

(4) Each axis reference position selection (R2584)

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	IN NC AXIS CONTROL n-TH AXIS	-	XA20 to 7	XA28 to F	XA30 to 7	XA38 to F

[Function]

This signal indicates the control status (NC control or PLC control) of the NC axis which can be operated under PLC control.

[Operation]

This signal turns ON when the NC axis is under NC control.

This signal turns OFF when the NC axis is under the PLC control.

The following shows the correspondence of axis Nos. and device Nos.

Device No.	Signal name	Device No.	Signal name
XA20	In NC axis control 1st axis	XA24	In NC axis control 5th axis
XA21	In NC axis control 2nd axis	XA25	In NC axis control 6th axis
XA22	In NC axis control 3rd axis	XA26	In NC axis control 7th axis
XA23	In NC axis control 4th axis	XA27	In NC axis control 8th axis

[Caution]

(1) "The NC axis which can be operated under PLC control" has the axis No. for PLC axis indexing, designated by "#12800 chgauxno".

(2) If the axis is moving, turning ON/OFF the "NC axis control selection n-th axis" leads an operation error. The signal is changed to ON/OFF after the axis has decelerated and stopped.

[Related signals]

(1) NC axis control selection n-th axis (YAC0 to YAC7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	EXT. MACHINE COORDINATE SYSTEM OFFSET DATA ILLEGAL n-TH AXIS	ECIL1 to 8	XA40 to 7	XA48 to F	XA50 to 7	XA58 to F

[Function]

This signal indicates that the external machine coordinate system offset data is illegal, as the changed amount by the data will exceed the rapid traverse feedrate.

[Operation]

This signal turns ON when the external machine coordinate system offset data is illegal.

Then the change of the external machine coordinate system offset data is ignored. The compensation is executed with the set value unchanged.

[Related signals]

(1) Ext. machine coordinate system offset data n-th axis (R5700 to R5715)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	VERTICAL AXIS PULL-UP PREVENTED n-TH AXIS		XA60 to 7	XA68 to F	XA70 to 7	XA78 to F

[Function]

This signal indicates that the vertical axis pull-up function has been prevented.

[Operation]

This signal is ON while the vertical axis pull-up function is prevented.

[Related signals]

(1) Vertical axis pull-up prevention request (YAE0 to YAE7)

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	SPINDLE-MODE ROTARY AXIS CONTROL MODE N-TH AXIS	ROTSPM1 to 8	XB40 to 7	XB48 to F	XB50 to 7	XB58 to F

[Function]

This signal indicates that the control axis for which the rotary axis spindle control is enabled in the parameter setting is currently in the spindle mode.

Each control axis is provided with this signal. The last number of the signal name indicates the control axis No.

[Related signals]

(1) Spindle-mode rotary axis control command n-th axis (ROTSPCn:YB40 and following)

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	REAL-TIME TUNING 1: SPEED GAIN HOLD-DOWN ON	VGHLD1 to 8	XB80 to 7	XB88 to F	XB90 to 7	XB98 to F

[Function]

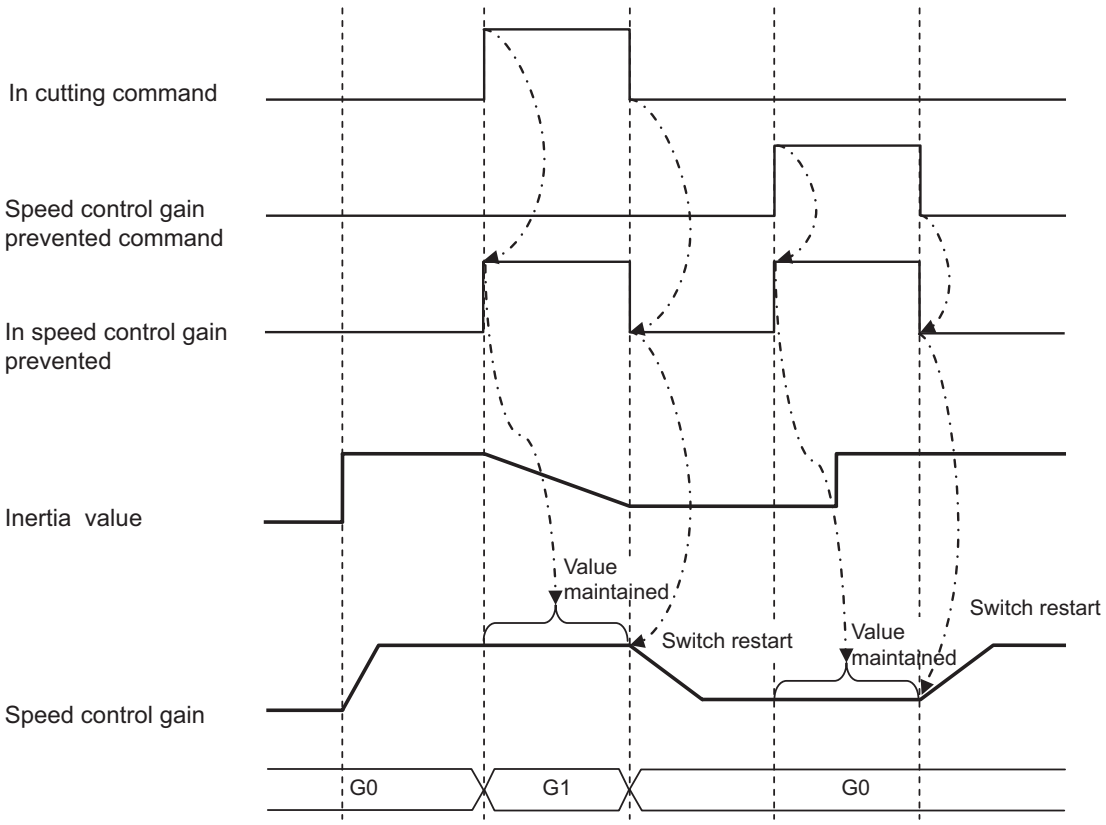
This signal indicates that speed control gain switching is currently stopped in the real-time tuning 1 function.

[Operation]

This signal indicates that speed control gain switching is stopped and the value of speed control gain is retained.

This signal is output when the "Speed control gain hold-down command" is ON or when the cutting command modal is effective, regardless of whether this function is enabled or disabled.

This signal is not output when speed control gain switching is performed. Also, the signal is not output when the option is set to OFF.



[Related signals]

(1) Real-time tuning 1: Speed control gain hold-down command (VGHLDC1:YB80)

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	MACHINE GROUP-BASED ALARM STOP: MACHINE GROUP-BASED PLC INTERLOCK ON	GQEMGO1 to 8	XBE0 to 7	XBE8 to F	XBF0 to 7	XBF8 to F

[Function]

This signal indicates that operation is stopped for "Machine group-based PLC interlock".

[Operation]

This signal indicates that operation has been stopped because the machine group-based alarm stop function was executed.

This signal is not output for the alarm stops other than that caused by the machine group-based alarm stop function.

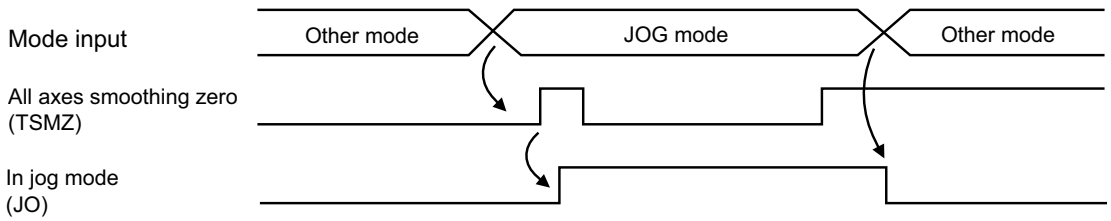
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN JOG MODE	JO	XC00	XD40	XE80	XFC0	X1100	X1240	X1380	X14C0

[Function]

This signal indicates that JOG mode is selected.

[Operation]

Mode is changed to JOG mode from other mode after "All axes smoothing zero" (TSMZ) (command acceleration/ deceleration delay is zero) is verified.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

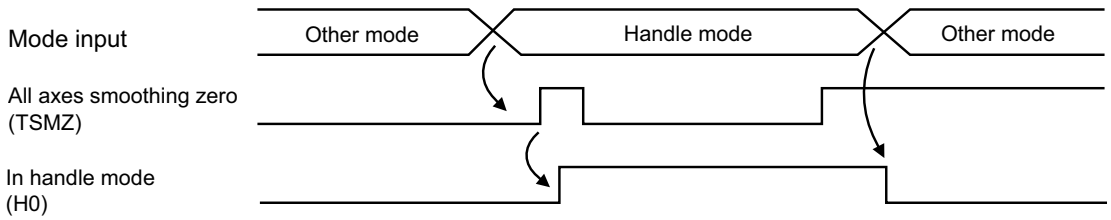
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN HANDLE MODE	HO	XC01	XD41	XE81	XFC1	X1101	X1241	X1381	X14C1

[Function]

This signal indicates that HANDLE mode is selected.

[Operation]

Mode is changed to HANDLE mode from other mode after "All axes smoothing zero" (TSMZn) (command acceleration/ deceleration delay is zero) is verified.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

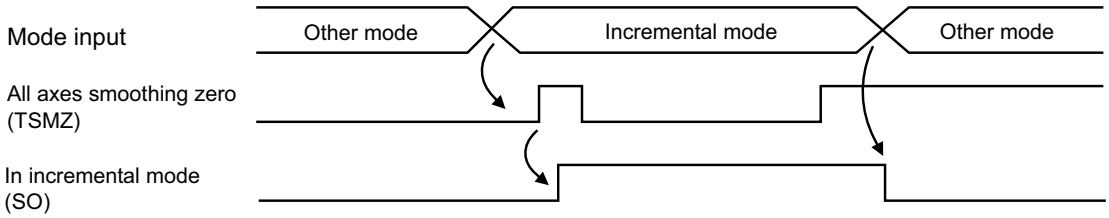
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN INCREMENTAL MODE	SO	XC02	XD42	XE82	XFC2	X1102	X1242	X1382	X14C2

[Function]

This signal indicates that INCREMENTAL mode is selected.

[Operation]

Mode is changed to INCREMENTAL mode from other mode after "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

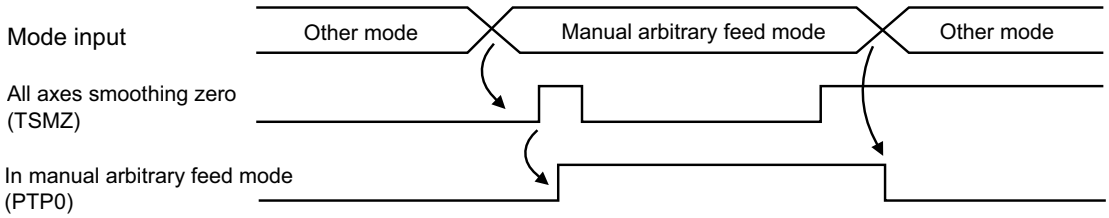
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN MANUAL ARBITRARY FEED MODE	PTPO	XC03	XD43	XE83	XFC3	X1103	X1243	X1383	X14C3

[Function]

This signal indicates that MANUAL ARBITRARY FEED mode is selected.

[Operation]

Mode is changed to MANUAL ARBITRARY FEED mode from other mode after "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

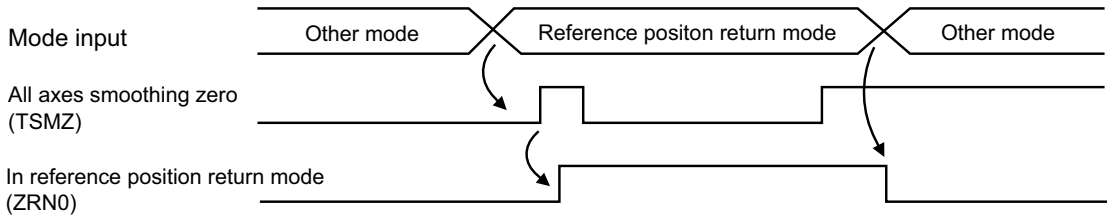
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN REFERENCE POSITION RETURN MODE	ZRNO	XC04	XD44	XE84	XFC4	X1104	X1244	X1384	X14C4

[Function]

This signal indicates that REFERENCE POSITION RETURN mode is selected.

[Operation]

Mode is changed from other mode to REFERENCE POSITION RETURN mode after "All axes smoothing zero" (command acceleration/deceleration delay is zero) has been verified.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

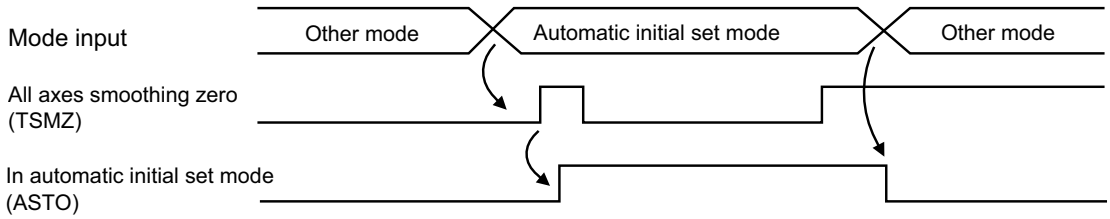
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN AUTOMATIC INITIAL SET MODE	ASTO	XC05	XD45	XE85	XFC5	X1105	X1245	X1385	X14C5

[Function]

This signal indicates that AUTOMATIC INITIAL SET MODE is selected.

[Operation]

Mode is changed over from other mode to IN AUTOMATIC INITIAL SET MODE mode after "All axes smoothing zero" (command acceleration/deceleration delay is zero) has been verified.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN JOG-HANDLE SIMULTANEOUS MODE	JHANO	XC06	XD46	XE86	XFC6	X1106	X1246	X1386	X14C6

[Function]

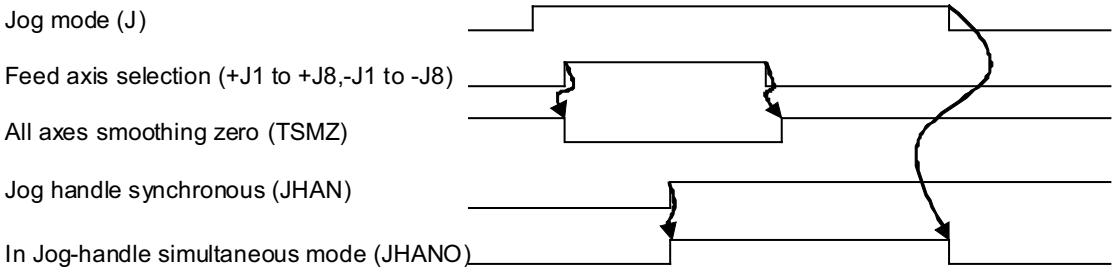
This signal indicates that the simultaneous operation of JOG and handle mode has been entered.

[Operation]

(1) This signal turns ON regardless of "All axes smoothing zero" (TSMZ) signal which informs there is no delay caused by the acceleration/deceleration time constants.

(2) This signal will not turn ON when the "Jog Mode" (J) signal is OFF, even if the "Jog-handle synchronous" (JHAN) signal is ON.

[Timing chart]


Jog mode (J)
Feed axis selection (+J1 to +J8,-J1 to -J8)
All axes smoothing zero (TSMZ)
Jog handle synchronous (JHAN)
In Jog-handle simultaneous mode (JHANO)

[Related signals]

(1) Jog mode (J:YC00)

(2) Jog handle synchronous (JHAN:YC7B)

(3) All axes smoothing zero (TSMZ:XC1A)

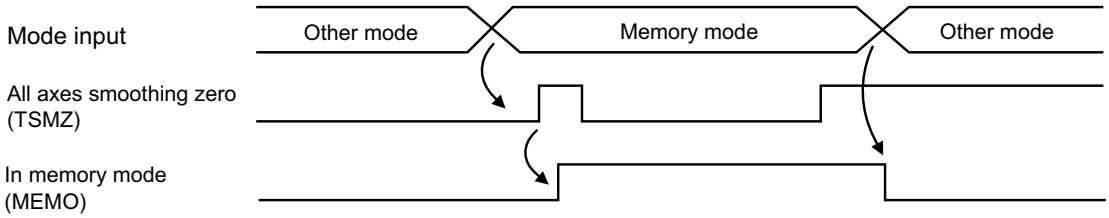
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN MEMORY MODE	MEMO	XC08	XD48	XE88	XFC8	X1108	X1248	X1388	X14C8

[Function]

This signal indicates that MEMORY mode is selected.

[Operation]

Mode is changed from other mode to MEMORY mode after "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

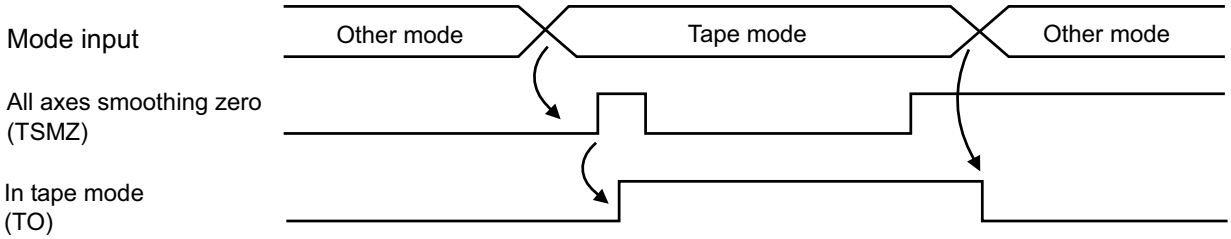
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN TAPE MODE	TO	XC09	XD49	XE89	XFC9	X1109	X1249	X1389	X14C9

[Function]

This signal indicates TAPE mode is selected.

[Operation]

Mode is changed from other mode to TAPE mode when "All axes smoothing zero" (TSMZ)(command acceleration/deceleration delay is zero) is verified.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

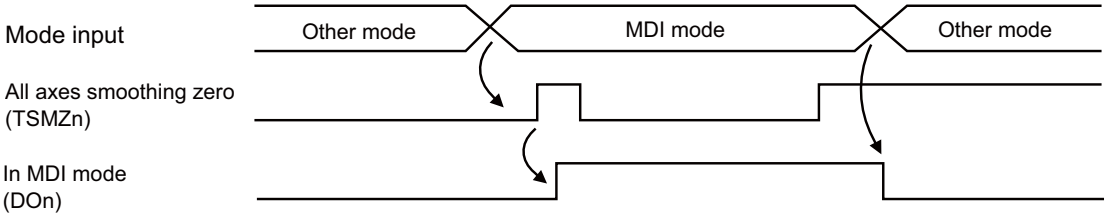
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN MDI MODE	DO	XC0B	XD4B	XE8B	XFCB	X110B	X124B	X138B	X14CB

[Function]

This signal indicates that MDI mode is selected.

[Operation]

Mode is changed from other mode to MDI mode when "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SUB PART SYSTEM CONTROL: SUB PART SYSTEM CONTROL I MODE ON	SBSMO	XC0E	XD4E	XE8E	XFCE	X110E	X124E	X138E	X14CE

[Function]

This signal indicates that "Sub part system control I mode" is selected for the operation mode.

The sub part system can be started using the sub part system control I command (G122) when this signal is ON.

[Operation]

This signal is ON at the sub part system while the "Sub part system control: Sub part system control I mode" signal (SBSM) is ON.

[Related signals]

(1) Sub part system control: Sub part system control I mode (SBSM)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	CONTROLLER READY COMPLETION	MA	XC10	XD50	XE90	XFD0	X1110	X1250	X1390	X14D0

[Function]

This signal indicates that the controller is ready for normal operation.

[Operation]

The signal turns ON when:

(1) The controller starts working successfully after it is turned ON or when no off-condition exists.

The signal turns OFF when:

(1) The controller is turned OFF.

(2) Trouble occurs with the controller (such as failure in the CPU, memory, etc.).

(3) "Servo alarm" which cannot be reset without turning OFF the power supply of the controller occurs.

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	SERVO READY COMPLETION	SA	XC11	XD51	XE91	XFD1	X1111	X1251	X1391	X14D1

[Function]

This signal indicates that the servo system is ready for normal operation.

In other words, the servo system (position control) is not working when the signal is OFF.

[Operation]

The signal turns ON when:

(1) The diagnosis on the servo system is completed successfully after the control unit is turned ON.

(2) "Servo alarm", if occurs, is reset. (Resetting may not be possible depending on the servo alarm contents.)

(3) "Emergency stop" input is removed.

(4) The power is turned OFF and ON again by entering the decryption code upon expiration set in the system lock.

The signal turns OFF when:

(1) "Servo alarm" occurs.

(2) "Emergency stop" is input.

(3) The power supply of controller is turned OFF.

(4) Trouble occurs with the controller (such as failure in the CPU or memory).

(5) The decryption code has not been entered to the controller by the specified expiration date in the system lock.

(Note 1) This signal (SA) cannot be turned OFF only with the "Servo OFF" (*SVFn) signal.

> **⚠ CAUTION** **Do not refer to this signal for a machine on which the system lock function is enabled. If this signal is referred to, unexpected motion may occur when the valid term has been expired.**

[Related signals]

(1) Servo ready completion output designation (R2625)

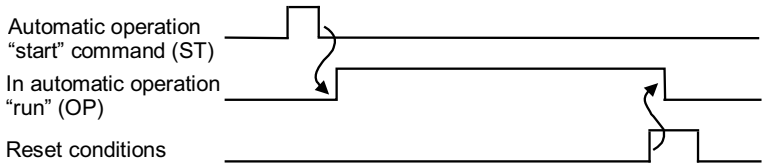
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN AUTOMATIC OPERATION "RUN"	OP	XC12	XD52	XE92	XFD2	X1112	X1252	X1392	X14D2

[Function]

This signal indicates that the controller is in automatic operation caused by "Auto operation "start" command" signal.

[Operation]

This signal stays ON from when automatic operation starts with the "Automatic operation "start" command (ST)" signal in the memory, MDI or tape mode, until the operation is reset.



(1) Reset conditions include the followings:
- "Reset & rewind (RRW)" is input.
- "Emergency stop" signal or "Servo alarm" signal is input.

(2) Signals that indicates status of automatic operation are "In automatic operation "start"(STL)" and "In automatic operation pause (SPL)" besides "In automatic operation "run"(OP)".
The ON/OFF state of these signals in each state are shown below.

	n automatic operation "RUN" (OP)	In automatic operation "START" (STL)	In automatic operation "PAUSE" (SPL)
Reset condition	0	0	0
Automatic operation stop condition	1	0	0
Automatic operation pause condition	1	0	1
Automatic operation start condition	1	1	0

The outline of each condition is as follows:
- Reset condition
  Automatic operation is stopped by one of reset conditions described above.
  (All states not in automatic operation are this state.)
- Automatic operation stop condition
  Automatic operation is stopped after completion of one block.
  (This state is entered during single block stop.)
- Automatic operation pause condition
  Automatic operation suspended in the course of execution of one block.
  (This state is entered when the "Automatic operation "pause" command" signal (*SP) is OFF.)
- Automatic operation start condition
  Automatic operation is being executed.

[Related signals]

(1) In automatic operation "start" (STL:XC13)
(2) In automatic operation "pause" (SPL:XC14)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN AUTOMATIC OPERATION "START"	STL	XC13	XD53	XE93	XFD3	X1113	X1253	X1393	X14D3

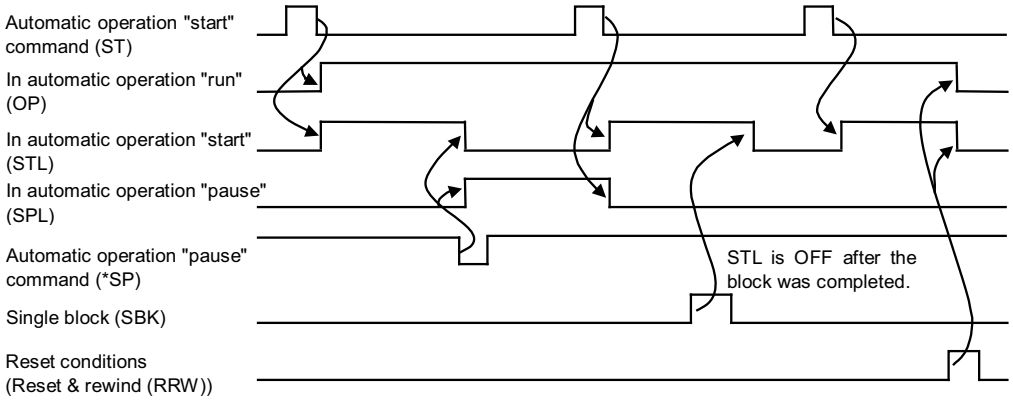
[Function]

This signal informs the PLC that the controller is started by automatic operation and motion command or M,S, T, B processing is in execution.

[Operation]

The signal turns ON by the "Automatic operation "start" command" signal (ST) in memory, MDI or tape mode, and OFF when automatic operation pause, block stop or reset condition occurs.

The "In automatic operation "start"" signal (STL) timing chart, including automatic operation "pause" and block stop, is shown below.


Automatic operation "start" command (ST)
In automatic operation "run" (OP)
In automatic operation "start" (STL)
In automatic operation "pause" (SPL)
Automatic operation "pause" command (*SP)
Single block (SBK)
Reset conditions (Reset & rewind (RRW))
STL is OFF after the block was completed.

(Note) For reset conditions, refer to the section on "In automatic operation "run"" (OP).

[Related signals]

(1) In automatic operation "run" (OP:XC12)

(2) In automatic operation "pause" (SPL:XC14)

(3) Automatic operation "start" command (ST:YC10)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN AUTOMATIC OPERATION "PAUSE"	SPL	XC14	XD54	XE94	XFD4	X1114	X1254	X1394	X14D4

[Function]

This signal informs that the controller operation has been stopped due to the "Auto operation "pause" command" signal, etc., during motion command or miscellaneous function command.

[Operation]

The "In automatic operation "pause"" signal (SPL) turns ON with the following factors during automatic operation using the memory, MDI or tape mode.

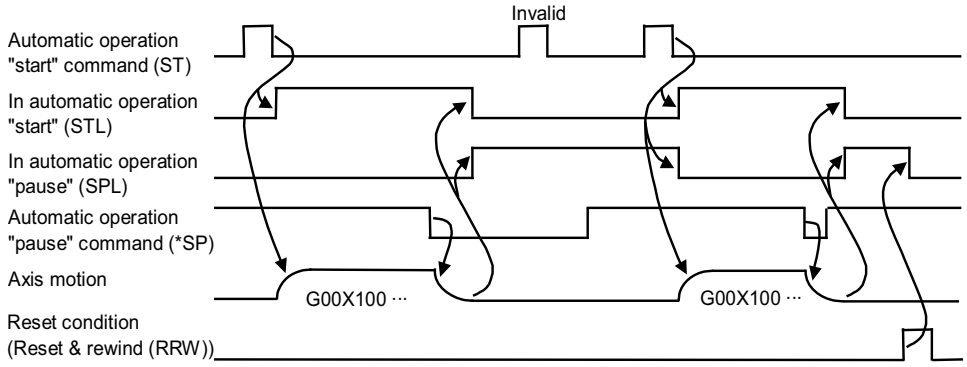
(1) When "Automatic operation "pause" command" signal (*SP) turns OFF.
(2) When mode changes to manual operation mode (jog, handle, incremental, reference position return mode, etc.).

This signal turns ON even during machine lock or a miscellaneous function (M, S, T, B) command.

This signal turns OFF in the following cases.

(1) When "Automatic operation "start" command" signal (ST) turns OFF from ON. However, this will be invalid if the "Automatic operation "pause" command" signal (*SP) is not turned back ON or if the mode is not automatic operation (memory, MDI, tape).
(2) When reset conditions are input.

The timing chart for the "In automatic operation "pause"" signal (SPL) is shown below.



(Note 1) Refer to the section on "In automatic operation "run"" (OP) for the rest conditions.

[Related signals]

(1) In automatic operation (OP:XC12)
(2) In automatic operation "start" (STL:XC13)
(3) Automatic operation "start" command (ST:YC10)
(4) Automatic operation "pause" command (*SP:YC11)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN "RESET"	RST	XC15	XD55	XE95	XFD5	X1115	X1255	X1395	X14D5

[Function]

This signal informs that the controller is in reset condition.

[Operation]

The signal turns ON:

(1) For about 4 to 5 seconds after the power is turned ON.
(2) While "Reset and rewind" (RRWn) signal is ON, and for about 0.5 to 1 seconds after "Reset and rewind" (RRWn) signal turns OFF.
(3) While "Emergency stop" signal is being input, and for 1 to 1.5 seconds after "Emergency stop" signal turns OFF.
(4) During "Servo alarm", and for 1 to 1.5 seconds after "Servo alarm" is removed.

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN MANUAL ARBITRARY FEED	CXN	XC16	XD56	XE96	XFD6	X1116	X1256	X1396	X14D6

[Function]

This signal is output during execution of manual arbitrary feed command.

[Operation]

The signal turns ON:

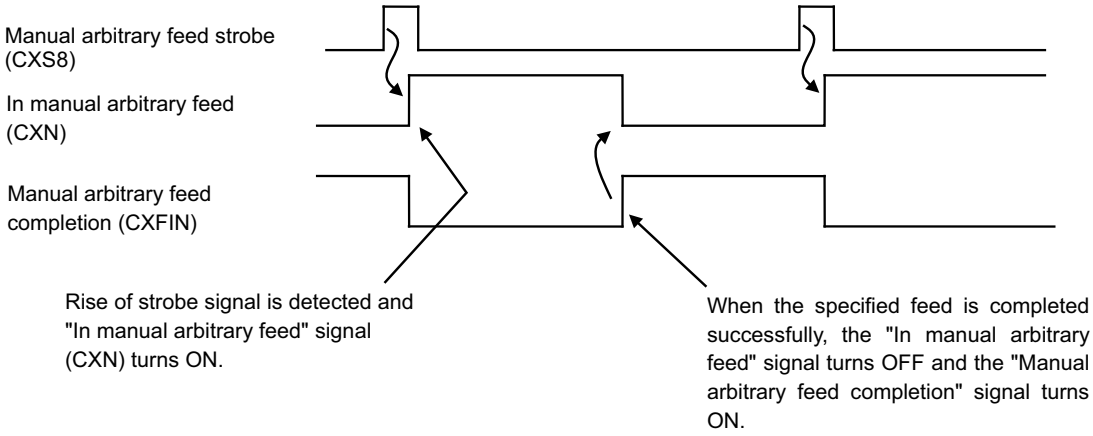
(1) "Manual arbitrary feed strobe" signal (CXS8n) turns ON during MANUAL ARBITRARY FEED mode.

The signal turns OFF:

(1) Commanded feed has been completed.

(2) When "Reset & Rewind" signal is input during execution of manual arbitrary feed command.

[Timing chart]


Manual arbitrary feed strobe (CXS8)
In manual arbitrary feed (CXN)
Manual arbitrary feed completion (CXFIN)
Rise of strobe signal is detected and "In manual arbitrary feed" signal (CXN) turns ON.
When the specified feed is completed successfully, the "In manual arbitrary feed" signal turns OFF and the "Manual arbitrary feed completion" signal turns ON.

[Related signals]

(1) Manual arbitrary feed strobe (CXS8:YCBF)

(2) In manual arbitrary feed (CXFIN:XC1C)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	IN REWIND	RWD	XC17	XD57	XE97	XFD7	X1117	X1257	X1397	X14D7

[Function]

This signal informs that the controller is indexing the memory mode.

[Operation]

The signal turns ON when "Reset & rewind" (RRWn) signal is turned ON by the PLC in memory mode (with M02 or M30 command), and turns OFF when the controller completes indexing the program in execution.

(Note 1) Since indexing of program in memory mode ends immediately, it may not be verified by user PLC.

[Related signals]

(1) Reset & rewind (RRW:YC1A)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	MOTION COMMAND COMPLETION	DEN	XC18	XD58	XE98	XFD8	X1118	X1258	X1398	X14D8

[Function]

This signal notifies that the commanded motion has been completed by the controller.

In the machining program when the motion command and miscellaneous function (M, S, T, B) command are specified in the same block, this signal can be used as a synchronization signal to determine whether miscellaneous function command is executed simultaneously with or after the motion command.

[Operation]

The signal turns ON when:

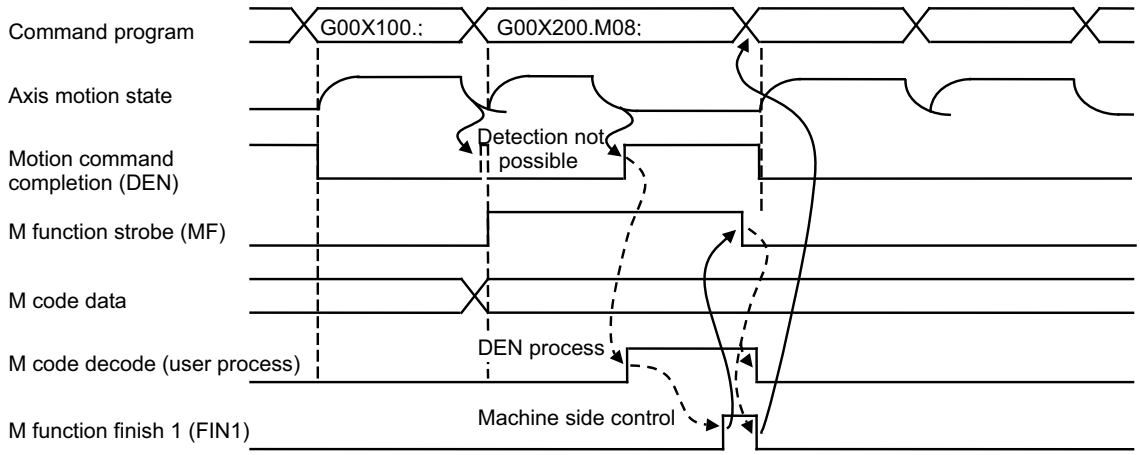
(1) The system is initialized after the power is turned ON.

(2) Execution of motion command is completed in automatic operation.

(3) Reset condition occurs.

(For reset conditions, refer to the section on "In automatic operation "run"" (OPn) signal.)

The timing chart for the "Motion command completion" (DENn) signal is shown below.



(Note 1) The "Motion command completion" signal is output even during machine lock.

(Note 2) Unless commanded motion is completed, this signal does not turn ON even when motion is suspended by interlock function or "Auto operation "pause" command" signal.

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	ALL AXES IN-POSITION	TIMP	XC19	XD59	XE99	XFD9	X1119	X1259	X1399	X14D9

[Function]

This signal informs the PLC that the all axis components of the controller are in commanded positions.

[Operation]

The signal turns ON when:

(1) when there is no acceleration/deceleration delay in all control axes and servo errors (remaining pulses) in positioning are within the specified range.

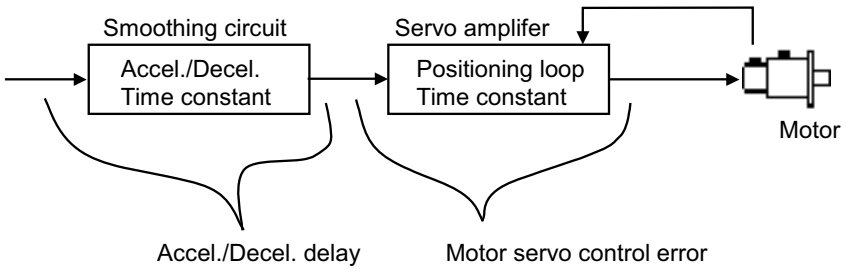
The signal turns OFF when:

(1) Acceleration/deceleration motion is delayed in a control axis.

(2) Servo positioning error (remaining pulses) for a control axis exceeds the specified range.

(Note 1) The signal may turn ON even during motion if the motion is an extremely low speed.

(Note 2) The condition where the servo errors must be in a specific range to turn ON the signal can be invalidated with parameters. In this case, the signal will turn ON/OFF depending on whether there is any delay in the acceleration/deceleration.



[Related signals]

(1) All axes smoothing zero (TSMZ:XC1A)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$6	$7	$8
A	ALL AXES SMOOTHING ZERO	TSMZ	XC1A	XD5A	XE9A	XFDA	X111A	X125A	X139A	X14DA

[Function]

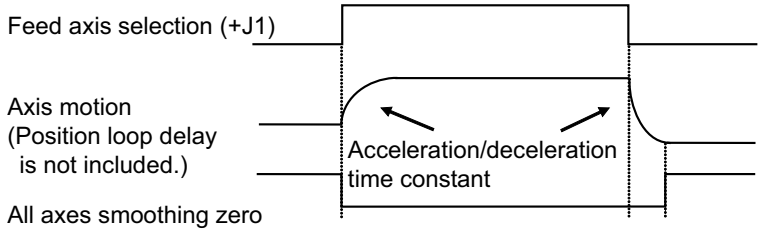
This signal informs the PLC that there is no delay (caused by the acceleration/deceleration time constants) in any of the controller control axis command system.

The PLC axis is not included in the control axis.

[Operation]

The signal turns ON when the movement amount commanded in automatic or manual operation, including delay amount of acceleration/deceleration time constant, is successfully output.

The signal turns OFF during execution of movement command, or if delay exists in acceleration/deceleration time constant.



(Note 1) The signal can turn ON even during machine lock.

(Note 2) The signal may turn ON during motion if the motion is an extremely low speed.

(Note 3) "In axis plus/minus motion" signals are OFF while "All axes smoothing zero" is ON.

[Related signals]

(1) All axes in-position (TIMP:XC19)

(2) In axis plus motion n-th axis (MVP1 to MVP8:X7C0 to 7)

(3) In axis minus motion n-th axis (MVM1 to MVM8:X7E0 to 7)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED COM-PLETION	CXFIN	XC1C	XD5C	XE9C	XFDC	X111C	X125C	X139C	X14DC

[Function]

This signal is output when motion commanded in manual arbitrary feed mode is completed.

[Operation]

The signal turns ON when:

(1) The motion commanded in manual arbitrary feed mode is completed.

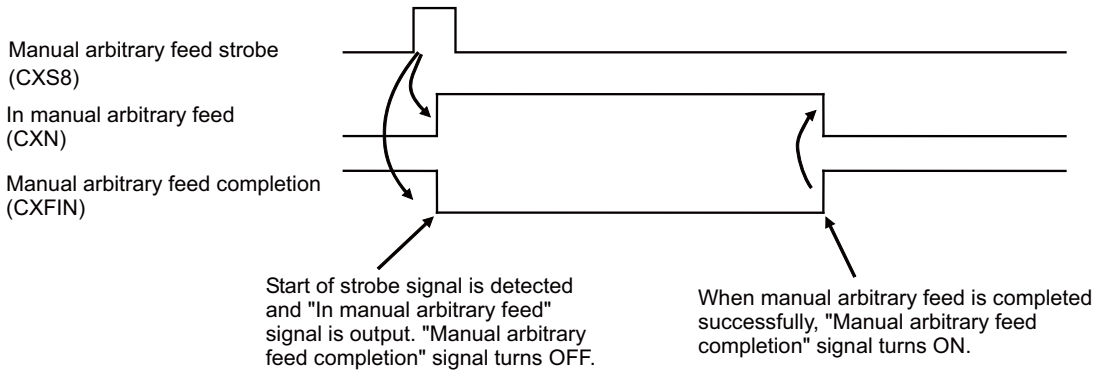
The signal turns OFF when:

(1) During motion in manual arbitrary feed mode.

(The signal stays OFF when motion is interrupted by a reset & rewind signal.)

(2) The power is turned ON.

[Timing chart]


Manual arbitrary feed strobe (CXS8)
In manual arbitrary feed (CXN)
Manual arbitrary feed completion (CXFIN)
Start of strobe signal is detected and "In manual arbitrary feed" signal is output. "Manual arbitrary feed completion" signal turns OFF.
When manual arbitrary feed is completed successfully, "Manual arbitrary feed completion" signal turns ON.

[Related signals]

(1) Manual arbitrary feed strobe (CXS8:YCBF)

(2) In manual arbitrary feed (CXN:XC16)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN HIGH-SPEED MACHINING MODE (G05)		XC1F	XD5F	XE9F	XFDF	X111F	X125F	X139F	X14DF

[Function]

This signal notifies that the operation is in high-speed machining mode.

[Operation]

This signal turns ON when:

(1) The high-speed machining mode is commanded in the machining program.

This signal turns OFF when:

(1) The cancelation of the high-speed machining mode is commanded in the machining program.

(2) The high-speed machining mode was finished with an operation such as NC reset.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN RAPID TRAVERSE	RPN	XC20	XD60	XEA0	XFE0	X1120	X1260	X13A0	X14E0

[Function]

This signal is output during rapid traverse motion in automatic operation (memory, MDI, tape).

[Operation]

(1) The signal is ON when:

- Rapid traverse motion in automatic operation.
  Fixed cycle positioning and reference position return (G28), etc., are included in the automatic operation rapid traverse besides the motion command by the G00 command.

(2) The signal turns OFF when:

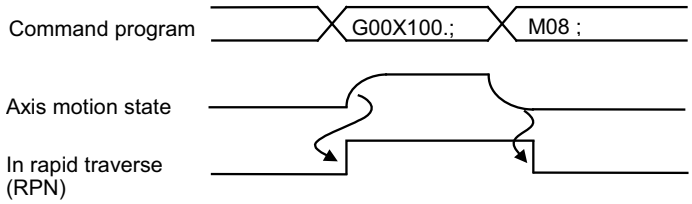
- The block in rapid traverse motion is completed during automatic operation.
- Rapid traverse motion is stopped by "Automatic operation "pause" command (Feed hold)" (*SPn) signal during automatic operation.
- Rapid traverse motion axis is stopped by interlock during automatic operation.
- The ratio of the "Cutting feedrate override code m" (*FVmn) becomes 0% during automatic rapid traverse operation.
- A stroke end (hardware or software) occurs during automatic rapid traverse operation.
- Reset condition occurs.

(Note 1) "In rapid traverse" (RPNn) signal can turn ON and OFF even during machine lock.

(Note 2) The signal is not output in manual operation.

(Note 3) For reset condition, refer to the section on "In automatic operation "run"" (OPn) signal.

The timing chart for "In rapid traverse" (RPNn) signal is shown below.



Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN CUTTING FEED	CUT	XC21	XD61	XEA1	XFE1	X1121	X1261	X13A1	X14E1

[Function]

This signal informs that given motion command is executed for cutting feed in automatic operation (memory, MDI, tape).

[Operation]

The signal turns ON when:

(1) Motion command is given for cutting feed in automatic operation.

The signal turns OFF when:

(1) The block in cutting feed in automatic operation is completed.

(2) Execution of cutting feed is suspended by "Automatic operation "pause" command" signal (*SP).

(3) Execution of cutting feed is stopped by interlock during automatic operation.

(4) The ratio of the cutting feedrate override becomes 0% during automatic cutting feed operation.

(5) A stroke end (hardware or software) occurs during automatic cutting feed operation.

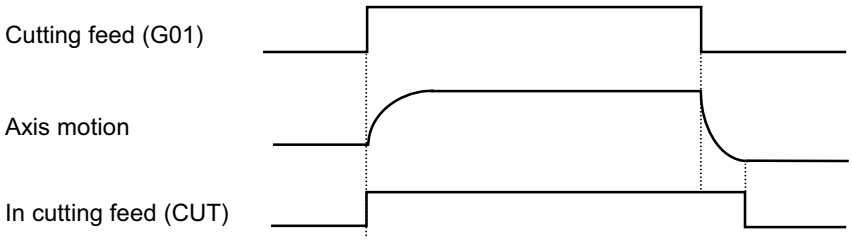
(6) Reset condition occurs.

(Note 1) The signal (CUT) can be turned ON and OFF during cutting feed even if machine interlock is applied.

(Note 2) Cutting feed commands in automatic operation include G01, G02, G03 and G31.

(Note 3) The signal is not output in manual operation.

(Note 4) For reset condition, refer to the section on "In automatic operation "run"" signal (OP).



Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN TAPPING	TAP	XC22	XD62	XEA2	XFE2	X1122	X1262	X13A2	X14E2

[Function]

This signal informs that commanded motion in automatic operation (memory, MDI, tape) is executed in canned tapping cycle, or tapping mode is selected for execution of commanded motion.

[Operation]

(1) The signal turns ON when:

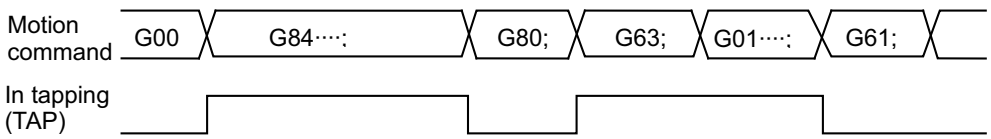
- Commanded motion in automatic operation is being executed in canned tapping cycle.
- Commanded motion in automatic operation is being executed in tapping mode (G63).

(2) The signal turns OFF when:

- Commanded motion is not being executed in fixed tapping cycle, nor in tapping mode.

The signal is reset by G80 or "01" group G command (G00, G01, G02, G03, G33) during canned tapping cycle, and by G61,

G62 and G64 during tapping mode.



(Note 1) This signal is output even during machine lock.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN THREAD CUTTING	THRD	XC23	XD63	XEA3	XFE3	X1123	X1263	X13A3	X14E3

[Function]

This signal is output during execution of thread cutting command.

[Operation]

The signal turns ON when:

(1) Thread cutting command is given.

The signal turns OFF when:

(1) Motion command other than thread cutting command is given.

(2) Reset condition occurs during thread cutting.

(Note) Spindle override is invalid (100%) during thread cutting.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN SYNCHRONOUS FEED	SYN	XC24	XD64	XEA4	XFE4	X1124	X1264	X13A4	X14E4

[Function]

This signal is output during execution of synchronous feed command.

[Operation]

The signal turns ON when:

(1) Synchronous feed command (G94) is given.

The signal turns OFF when:

(1) Asynchronous feed command (G95) is given.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN CONSTANT SURFACE SPEED	CSS	XC25	XD65	XEA5	XFE5	X1125	X1265	X13A5	X14E5

[Function]

This signal informs that automatic operation is under constant circumferential (surface) speed control.

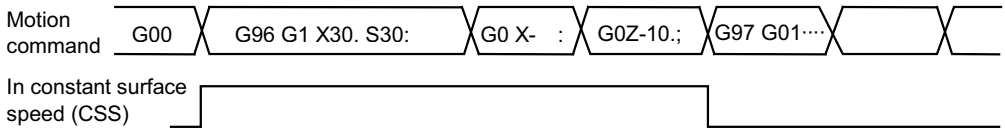
[Operation]

The signal turns ON when:

(1) Constant surface speed control mode (G96) is selected during automatic operation.

The signal turns OFF when:

(1) Constant surface speed control off command (G97) is given.



(Note 1) This signal (CSS) is output even during machine lock.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN SKIP	SKIP	XC26	XD66	XEA6	XFE6	X1126	X1266	X13A6	X14E6

[Function]

This signal is output while skip command (G31) is being executed.

[Operation]

The signal turns ON when:

(1) Skip command (G31) is being executed with automatic operation.

The signal turns OFF when:

(1) Block having a skip command is completed.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN REFERENCE POSITION RETURN	ZRNN	XC27	XD67	XEA7	XFE7	X1127	X1267	X13A7	X14E7

[Function]

This signal is output while reference position return command is being executed.

[Operation]

The signal turns ON when:

(1) G28 command is executed.

(2) G30 command is executed.

(3) Manual reference position return mode is selected.

The signal turns OFF when:

(1) All cases other than above.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN INCH UNIT SELECTION	INCH	XC28	XD68	XEA8	XFE8	X1128	X1268	X13A8	X14E8

[Function]

This signal informs that the controller uses inch unit for data input.

[Operation]

This signal turns ON when inch unit is selected.

During G20 (Inch unit command) modal, "In inch unit selection" signal turns ON.

change with machine parameter "#1041 I_inch".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN DISPLAY LOCK	DLNK	XC29	XD69	XEA9	XFE9	X1129	X1269	X13A9	X14E9

[Function]

This signal informs that the results of the movement command executed by the control unit are not reflected onto POSITION screen (display locked).

[Operation]

This signal turns ON while the display lock signal (DLK) is input.

The display lock operation is validated immediately after the display lock signal (DLK) turns ON.

[Related signals]

(1) Display lock (DLK:YC29)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	F1-DIGIT COMMANDED	F1DN	XC2A	XD6A	XEAA	XFEA	X112A	X126A	X13AA	X14EA

[Function]

This signal informs that the controller uses F1-digit commands (F1 to 5) to control operation.

[Operation]

The signal turns ON when:

(1) F1-digit command (F1 to 5) is selected for feedrate command currently being executed.

The signal turns OFF when:

(1) Block having a motion command specified with F1-digit code is completed.

(2) Operation is stopped by "Automatic operation "pause" command" signal (*SP) during execution of motion command by F1-digit command.

(3) Operation is stopped by "Interlock" signal during execution of motion command by F1-digit command.

(4) Reset condition occurs.

(For details of reset conditions, refer to the description about "In automatic operation "run"" signal (OP).)

(Note 1) The machine parameter, base specification parameter "#1079 F1digt" must be validated and "#1185 to 89 F1-digit feedrate" must be set to use the F1-digit command.

[Related signals]

(1) F1-digit No. code (F11 to 18:XC30 to XC33)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN TOOL LIFE MANAGEMENT	TLFO	XC2B	XD6B	XEAB	XFEB	X112B	X126B	X13AB	X14EB

[Function]

This signal is output during the tool life management.

[Operation]

In tool life management signal turns ON when the tool life management (#1103 T_Life) on the parameter is ON.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LIFE MANAGEMENT: TEMPORARY CANCEL OF TOOL LIFE EXPIRATION ON		XC2C	XD6C	XEAC	XFEC	X112C	X126C	X13AC	X14EC

[Function]

This signal indicates that the "Tool life over" signal is temporary canceled.

[Operation]

This signal turns ON when:

- The "Temporary cancel of tool life expiration" signal turns ON.

This signal turns OFF when:

- The "Tool life over" signal is OFF at the falling edge of the "Temporary cancel of tool life expiration" signal.
  (However, this signal remains ON even when the "Tool life over" signal is ON because it is canceled temporarily.)
- The NC is reset.
- The "Tool life over" signal turns OFF while this signal is output.

[Related signals]

(1) Tool life over (TLOV:XC2E)

(2) Tool life management: Temporary cancel of tool life expiration (YC98)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LIFE MANAGEMENT: TEMPORARY CANCEL OF TOOL GROUP LIFE EXPIRATION ON		XC2D	XD6D	XEAD	XFED	X112D	X126D	X13AD	X14ED

[Function]

This signal indicates that the "Tool group life over" signal is temporary canceled.

[Operation]

This signal turns ON when:

- The "Temporary cancel of tool group life expiration" signal turns ON.

This signal turns OFF when:

- The "Tool group life over" signal is OFF at the falling edge of the "Temporary cancel of tool group life expiration" signal.
  (However, this signal remains ON even when the "Tool group life over" signal is ON because it is canceled temporarily.)
- The NC is reset.
- The "Tool group life over" signal turns OFF while this signal is output.

[Related signals]

(1) Tool group life over (XC2F)

(2) Tool life management: Temporary cancel of tool group life expiration (YC99)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LIFE OVER	TLOV	XC2E	XD6E	XEAE	XFEE	X112E	X126E	X13AE	X14EE

[Function]

This signal notifies that a tool has reached to its lifetime (Usage data ≧ Life data).

[Operation]

The signal turns ON when usage data of tool is same as or has exceeded the life data. Note that this signal is only output and does not stop automatic operation or other operations of the controller.

<For Tool life management I or III for M system>

ON condition	#1246 set18/bit0 = 0	the currently selected tool has reached its lifetime (usage data ≧ life data). (Time-count method: during cutting feed) (Number of uses-count method: Type 1 = at the start of cutting feed, Type 2 = at Reset)
		the lifetime of the selected tool is expired at the time of tool selection. (Same timing as Tool function strobe 1 signal)
	#1246 set18/bit0 = 1	any of the tools in the currently selected group (or all the registered tool for Tool life management 3) has reached to its lifetime (usage data ≧ life data). (Time-count method: during cutting feed) (Number of uses-count method: Type 1 = at the start of cutting feed, Type 2 = at Reset)
		the lifetime of any of the tools in the group is expired at the time of group selection. (Same timing as Tool function strobe 1 signal)
OFF condition	#1246 set18/bit0 = 0	the tool selection has been completed. (At a T command. Note that if the next tool has reached to the lifetime, this signal is kept ON.)
		the tool status of the currently selected tool is cleared.
	#1246 set18/bit0 = 1	the group selection has been completed. (At a T command. Note that if the next selected group contains any expired tool, this signal is kept ON.)
		the usage data becomes smaller than the life data (usage data < life data).

<For Tool life management I for L system>

ON condition	T command is given after a currently selected tool has reached its life (usage data ≧ life data)
	The selected tool has already reached its life at the time of tool selection (Same timing as T function strobe 1 signal)
OFF condition	Tool selection is finished (When T command is issued. However it remains ON if the next tool has reached its life)
	Tool status of a currently selected tool is cleared

<For Tool life management II for M and L system>

ON condition	the currently selected tool has reached its lifetime (usage data ≧ life data). (Time-count method: during cutting feed) (Number of uses-count method: Type 1 = at the start of cutting feed, Type 2 = at Reset)
	all tools in the group have reached their lifetimes at the time of group selection. (Same timing as Tool function strobe 1 signal)
OFF condition	the group selection has been completed. (At a T command. Note that if the next selected group is a life-expired group, the signal is kept ON.)
	the usage data for the currently selected group is cleared.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL GROUP LIFE OVER		XC2F	XD6F	XEAF	XFEF	X112F	X126F	X13AF	X14EF

[Function]

This signal notifies that all tools in the tool group have reached to their lifetimes.

This signal is valid only for tool life management II.

The output condition can be selected by the parameter "#1277 ext 13/bit0". The count method of usage count will also be switched by this parameter.

[Operation]

The signal turns ON when all tools in the group mounted on the spindle have reached to their lifetimes or malfunction.

<Type 1> (#1277 ext13/bit0: 0)

This signal notifies that all tools in a group have reached their lives.

ON condition	The last tool of a currently selected group is determined as life-expired (Note) (Time-count type: during cutting feed) (Number of uses-count type: Type 1 = at the start of cutting feed, Type 2 = at Reset)
	” Tool skip” signal (to be described) is input to the last tool of a currently selected group
	All the tools of the selected group are life-expired at the time of group selection (Same timing as TF output)
OFF condition	Group selection is finished (When T command is issued. However it remains ON if the next group is an expired group)
	The usage data of a currently selected group is cleared (When the “Tool change reset” signal (to be described) is input, for example)

(Note) The criterion to judge the tool life end can be changed by the parameter (aux04/bit0).

<Type 2> (#1277 ext13/bit0: 1)

This signal notifies that there is a life-expired group among all the registered groups.

(Life-expired group: a group in which there is no usable tool (no "Unused" and "Used" tools).)

ON condition	There is any life-expired group among all the registered groups. (The condition when a group is determined as life-expired is the same as for Type 1.)
OFF condition	The life-expired group is cleared. (The condition when life-expired state of a group is canceled is the same as for Type 1.)

[Caution]

(1) When this signal is used in the tool life management II, refer to the next ladder cycle after the spindle tool is changed.
(This signal will not change in the same cycle in which the spindle tool was changed.)

(2) This signal is only output and does not stop automatic operation or other operations of the controller.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	F1-DIGIT NO. CODE (1, 2, 4, 8)	F11 to F18	XC30 to 3	XD70 to 3	XEB0 to 3	XFF0 to 3	X1130 to 3	X1270 to 3	X13B0 to 3	X14F0 to 3

[Function]

F1-digit feed function No. is output.

[Operation]

When F1-digit feed command specified in memory, MDI or tape operation is executed, No. of that F1-digit feed function is set with a code.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TIMING SYNCHRONIZATION BETWEEN PART SYSTEMS		XC34	XD74	XEB4	XFF4	X1134	X1274	X13B4	X14F4

[Function]

This signal informs that the timing synchronization between part systems is being executed.

[Operation]

1 : This signal is output while the timing synchronization between part systems is commanded in one part system to when the corresponding timing synchronization between system command is commanded in the other part system (during the timing synchronization between part systems).

0 : When the timing synchronization between part systems is not executed, this signal is not output.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN PLC INTERRUPT	PCINO	XC35	XD75	XEB5	XFF5	X1135	X1275	X13B5	X14F5

[Function] [Operation]

This signal turns ON at the beginning of a PLC interruption. Turns OFF when the PLC interruption is completed by M99 or a reset.

[Related signals]

(1) PLC interrupt (PIT:YC2E)

(2) PLC interrupt program number (R2518, R2519)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	ILLEGAL AXIS SELECTED	ASLE	XC37	XD77	XEB7	XFF7	X1137	X1277	X13B7	X14F7

[Function]

This signal is output if axis (No.) selected in handle mode or manual arbitrary feed mode is illegal.

[Operation]

The signal turns ON when:

(1) For handle mode.If specified handle axis No. is beyond the maximum number of control axes.

(2) For manual arbitrary feed mode.If specified manual arbitrary feed axis No. is beyond the maximum number of control axes.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M CODE INDEPENDENT OUTPUT M00	DM00	XC40	XD80	XEC0	X1000	X1140	X1280	X13C0	X1500

[Function]

This signal informs that a special miscellaneous function (M00) is selected and commanded. When a special M function is specified, "Normal miscellaneous function strobe" signal and "M code data" are output.

M code independent outputs include M01, M02 and M30.

[Operation]

When M00, M01, M02 or M30 is specified during auto operation (memory, MDI or tape), or by manually set numerical command, this signal turns ON. The signal turns OFF when M function finish signal, reset signal or reset & rewind signal is given.

Machining program	M code independent output	Abbr.	Answer back to controller
M00	M00	DM00	Fin 1 or Fin 2
M01	M01	DM01	Fin 1 or Fin 2
M02	M02	DM02	Reset & rewind signal ("Fin" is not sent back)
M30	M30	DM30	Reset & rewind signal ("Fin" is not sent back)

If motion command and/or dwell is present in the same block, the signal turns ON after completion of dwell.However, the signal is not output if M function finish signal turns ON before completion of motion command or dwell.

Generally, each M code is used for the following purpose:

M00 Program stop

M01 Optional stop

M02,M30Program end

Operation on user PLC side

(1) For M00

When M00 is input, single block signal (SBK) is turned ON and M function finish signal (Fin 1 or Fin 2) is sent back.

(2) For M01

When M01 is input, optional stop switch setting (ON or OFF) is checked. If the setting is "ON", single block signal is turned ON and M function finish signal is sent back, like the case with M00. If the setting is "OFF", M function finish signal is sent back immediately.

(3) For M02, M30

When motion where M02 or M30 was input (spindle stop, coolant stop, etc.) is completed, reset & rewind signal (RRW) is sent back instead of M function finish signal. If M function finish (Fin 1, Fin 2) signal is sent back, "program error" may occur.

[Related signals]

(1) M code independent output M01 (DM01:XC41)

(2) M code independent output M02 (DM02:XC42)

(3) M code independent output M30 (DM30:XC43)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M CODE INDEPENDENT OUTPUT M01	DM01	XC41	XD81	XEC1	X1001	X1141	X1281	X13C1	X1501

[Function][Operation]

Refer to "M CODE INDEPENDENT OUTPUT M00".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M CODE INDEPENDENT OUTPUT M02	DM02	XC42	XD82	XEC2	X1002	X1142	X1282	X13C2	X1502

[Function][Operation]

Refer to "M CODE INDEPENDENT OUTPUT M00".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M CODE INDEPENDENT OUTPUT M30	DM30	XC43	XD83	XEC3	X1003	X1143	X1283	X13C3	X1503

[Function][Operation]

Refer to "M CODE INDEPENDENT OUTPUT M00".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN MANUAL SPEED COMMAND VALID		XC48	XD88	XEC8	X1008	X1148	X1288	X13C8	X1508

[Function]

This signal indicates that the "Manual speed command valid" signal has turned ON and the manual speed command is valid in the controller.

[Operation]

This signal turns ON when the "Manual speed command valid" signal has turned ON and the manual speed command has been enabled in NC.

This signal turns OFF when the "Manual speed command valid" signal has turned OFF and the manual speed command has been disabled in NC.

[Related signals]

(1) Manual speed command valid (YC9D)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL NUMERICAL COMMAND	MMS	XC49	XD89	XEC9	X1009	X1149	X1289	X13C9	X1509

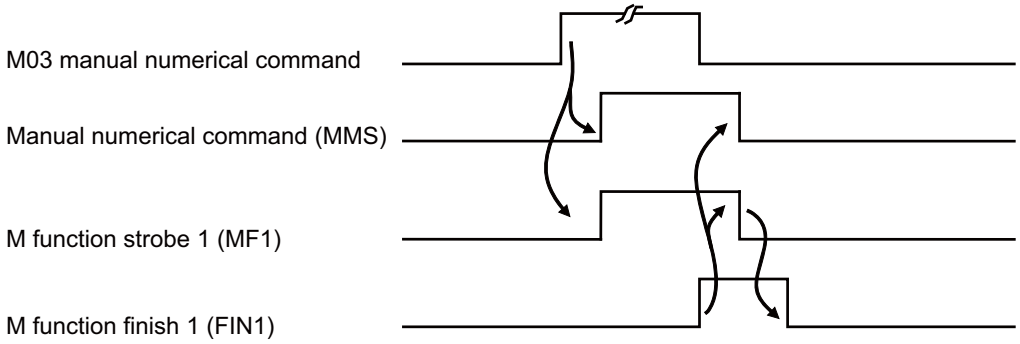
[Function]

This signal informs that M, S, T or B (2nd miscellaneous function) command is given with a specific display format selected on the setting and display unit.With the signal, user PLC discriminates the command from that given in normal automatic operation.

[Operation]

The signal turns ON when M, S, T or B signal is specified with a specific display format in manual or automatic operation (other than auto start). Like M function strobe signal, the signal turns OFF when M function finish 1 or 2 signal turns ON, or in case of reset.

(Example)



[Related signals]

(1) M function strobe (MFn:XC60)
(2) S function strobe (SFn:XC64)
(3) T function strobe 1 (TF1:XC68)
(4) 2nd M function strobe 1 (BF1:XC6C)
(5) M function finish 1 (FIN 1:YC1E)
(6) M function finish 2 (FIN 2:YC1F)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN TOOL ESCAPE AND RETURN MODE		XC4A	XD8A	XECA	X100A	X114A	X128A	X13CA	X150A

[Function]

This signal indicates in tool escape and return mode.

[Operation]

In order to designate a halted point, turn ON a transit point switch when operation is stopped by feed hold or single block. When recognition of the halted point is completed, this signal turns ON and the tool escape and return mode will be established.

Statuses of each signal after the machining program is halted are explained below.

The following (a) to (e) correspond to (a) to (e) in the figure below.

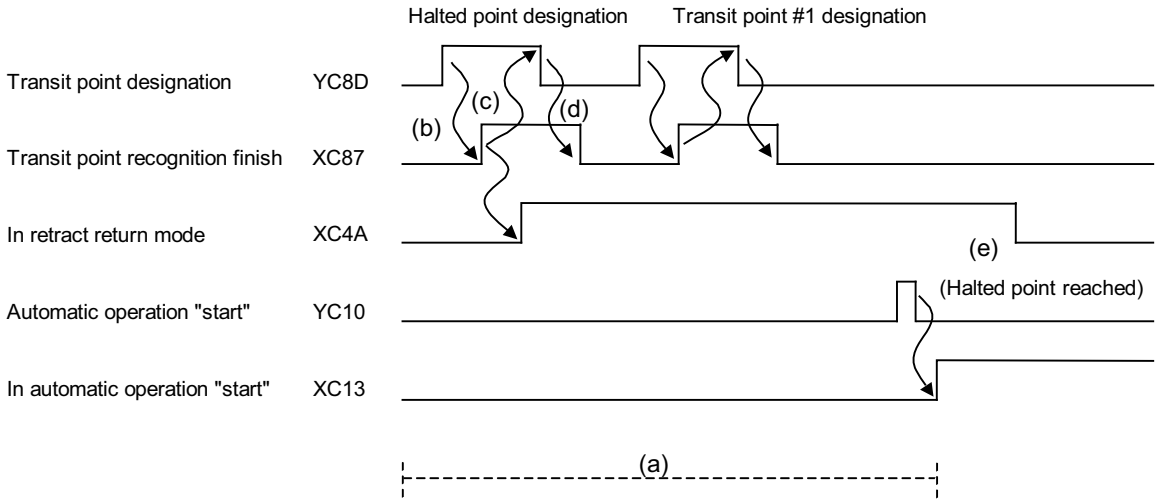
(a) The recognition of the transit point is performed in automatic operation but not in automatic operation start.

(b) When a user turns ON the "tool escape and return transit point designation" signal (YC8D), NC turns on the "tool escape and return transit point recognition finish" signal (XC87) and recognition will be completed.

(c) When the "tool escape and return transit point recognition finish" signal (XC87) turns ON, the user turns OFF the "tool escape and return transit point designation" signal (YC8D).

(d) When the "tool escape and return transit point designation" signal (YC8D) is OFF, NC also turns OFF the "tool escape and return transit point recognition finish" signal (XC87).

(e) The "in tool escape and return mode" signal turns OFF when a tool reaches the halted point, or when reset1/reset2 or reset & rewind or emergency stop is performed.



(Note) When reset1, reset2, reset & rewind or emergency stop is attempted during the escape and return mode, the memorized transit point and halted point will be canceled. The in escape and return mode will be reset and finished.

[Related signals]

(1) Tool escape and return transit point recognition finish (XC87)

(2) Tool escape and return transit point designation (YC8D)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SUB PART SYSTEM CONTROL: SUB PART SYSTEM PROCESSING	SBS	XC4E	XD8E	XECE	X100E	X114E	X128E	X13CE	X150E

[Function]

This signal notifies that the system is started as a sub part system.

If there is a PLC processing to be executed only when the sub part system is started, use this signal to check whether the sub part system is already started or not.

[Operation]

This signal turns ON at the sub part system when the system is started with the sub part system "start" command.

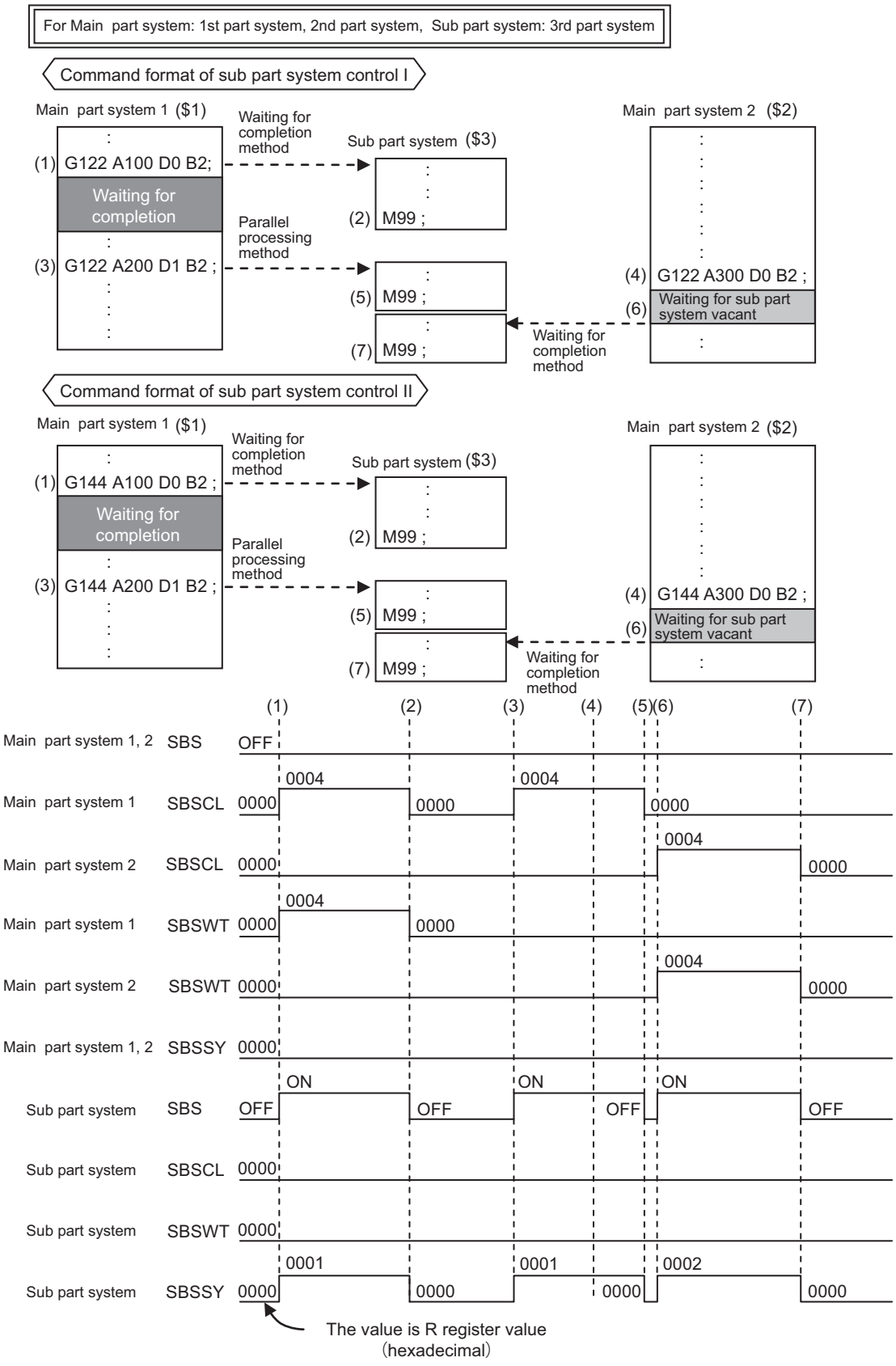
The PLC input signals related to the sub part system control return "0" when the "Sub part system control: Sub part system processing" signal (SBS) is OFF.

The following shows which part system outputs PLC input signals related to the sub part system control. Also, the output values and operation examples are given.

PLC input signal	Part system that outputs signals	Output signal value
Sub part system control: Sub part system processing (SBS:XC4E)	Sub part system	1: ON / 0: OFF
Sub part system control: Sub part system control II identification No. (SBSID:R616) (Note)	Sub part system	Sub part system identification No.
Sub part system control: Calling sub part system (SBSCL:R617)	Calling sub part system	System bit of sub part system
Sub part system control: Waiting for sub part system completion (SBSWT:R618)	Calling sub part system	System bit of sub part system
Sub part system control: Caller of sub part system (SBSSY:R619)	Sub part system	System bit of calling sub part system

(Note) The "Sub part system control: Sub part system control II identification No." (SBSID) signal is used only for the sub part system control II.

The signal is not output from a sub part system started with the sub part system control I.


For Main part system: 1st part system, 2nd part system, Sub part system: 3rd part system
Command format of sub part system control I
Main part system 1 ($1)
Waiting for completion method
Sub part system ($3)
Main part system 2 ($2)
(1) G122 A100 D0 B2;
Waiting for completion
(2) M99 ;
Parallel processing method
(3) G122 A200 D1 B2 ;
(4) G122 A300 D0 B2 ;
(5) M99 ;
(6) Waiting for sub part system vacant
(7) M99 ;
Waiting for completion method
Command format of sub part system control II
Main part system 1 ($1)
Waiting for completion method
Sub part system ($3)
Main part system 2 ($2)
(1) G144 A100 D0 B2 ;
Waiting for completion
(2) M99 ;
Parallel processing method
(3) G144 A200 D1 B2 ;
(4) G144 A300 D0 B2 ;
(5) M99 ;
(6) Waiting for sub part system vacant
(7) M99 ;
Waiting for completion method
(1) (2) (3) (4) (5) (6) (7)
Main part system 1, 2 SBS OFF
Main part system 1 SBSCL 0000 0004 0000 0004 0000
Main part system 2 SBSCL 0000 0004 0000
Main part system 1 SBSWT 0000 0004 0000
Main part system 2 SBSWT 0000 0004 0000
Main part system 1, 2 SBSSY 0000
Sub part system SBS OFF ON OFF ON OFF ON OFF
Sub part system SBSCL 0000
Sub part system SBSWT 0000
Sub part system SBSSY 0000 0001 0000 0001 0000 0002 0000
The value is R register value
(hexadecimal)

[Related signals]

(1) Sub part system control: Sub part system control II identification No. (SBSID:R616)

(2) Sub part system control: Calling sub part system (SBSCL:R617)

(3) Sub part system control: Waiting for sub part system completion (SBSWT:R618)

(4) Sub part system control: Caller of sub part system (SBSSY:R619)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN CIRCULAR FEED IN MANUAL MODE		XC4F	XD8F	XECF	X100F	X114F	X128F	X13CF	X150F

[Function]

This signal indicates that the circular feed in manual mode is valid.

[Operation]

This signal turns ON when the "Circular feed in manual mode valid" signal turns ON.

[Caution]

This signal does not turn ON in the following conditions.

(1) Either X axis or Y axis is in machine lock.
(In this case, even machine lock is not performed.)
(2) Either X axis or Y axis is not completed the reference position return.
(3) Either X axis or Y axis is in servo OFF.
(4) When the NC is in one of the following states.
- Automatic operation (OP)
- Emergency stop
- Reset

(5) The current position is outside of the specified movable range.
(6) The setting value which is specified with R register is illegal.

[Related signals]

(1) Circular feed in manual mode valid (YC7E)
(2) Circular feed in manual mode operation mode data (R2636,7)
(3) Circular feed in manual mode basic point X data (R2644,5)
(4) Circular feed in manual mode basic point Y data (R2648,9)
(5) Circular feed in manual mode gradient/arc center X data (R2668,9)
(6) Circular feed in manual mode gradient/arc center Y data (R2672,3)
(7) Circular feed in manual mode travel range X+ data (R2652,3)
(8) Circular feed in manual mode travel range X- data (R2656,7)
(9) Circular feed in manual mode travel range Y+ data (R2660,1)
(10) Circular feed in manual mode travel range Y- data (R2664,5)
(11) Circular feed in manual mode current position X (R636,7)
(12) Circular feed in manual mode current position Y (R640,1)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M FUNCTION STROBE 1	MF1	XC60	XDA0	XEE0	X1020	X1160	X12A0	X13E0	X1520

[Function]

This signal informs that the 1st set of miscellaneous functions (M code) is commanded with the automatic operation (memory, MDI, tape) machining program or manual numerical command input.

The miscellaneous function is also called the M function, and is used to issue miscellaneous functions such as ON/OFF of the cutting oil, and normal/reverse/stop of the spindle, etc., for the target machine.

[Operation]

[Normal method (if parameter "#1278 ext14/bit1"= "0")]

This signal turns ON when:

(1) The 1st set of M function (M code) is specified in automatic operation (memory, MDI or tape mode).

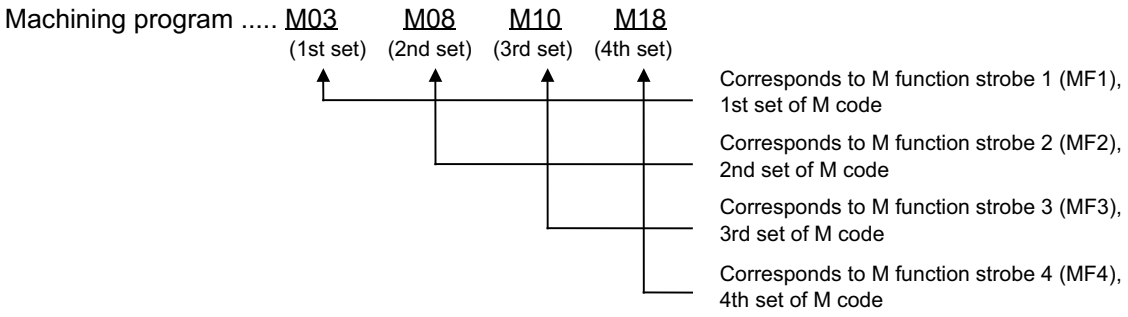
(2) M function (M code) is specified by manual numerical command input.

The signal turns OFF when:

(1) M function finish 1 signal (FIN1) or M function finish 2 signal (FIN2) turns ON.

(2) Reset condition occurs.(Refer to the "In automatic operation "run"" signal (OP) section for details on the reset conditions.)

(Note 1) When built-in PLC is used, four sets of M functions can be specified at the same time. The relation of the machining program and M function strobe is shown below.

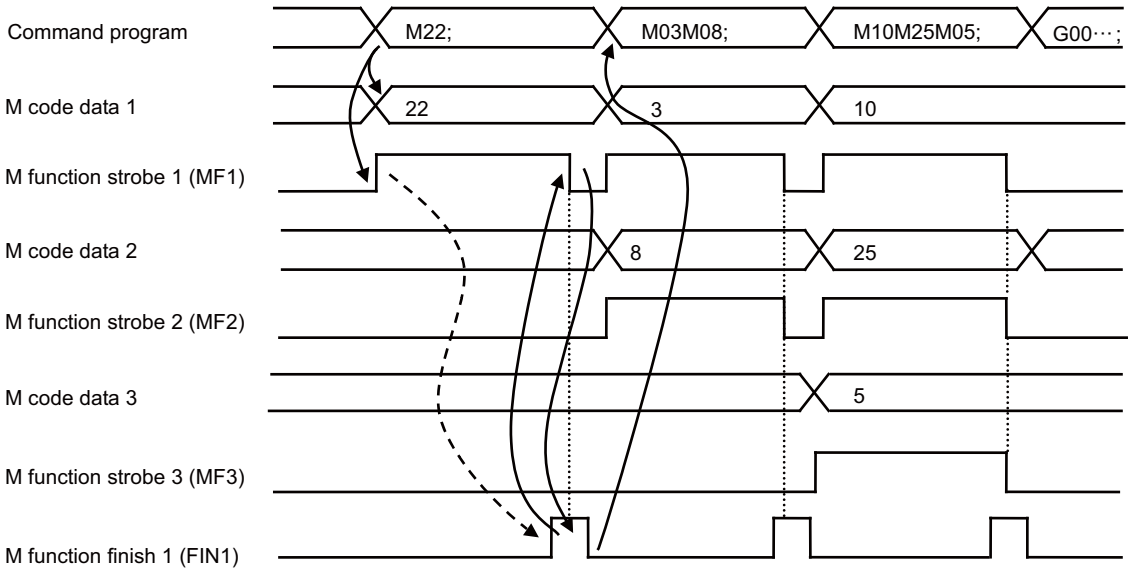

Machining program M03 M08 M10 M18
(1st set) (2nd set) (3rd set) (4th set)
Corresponds to M function strobe 1 (MF1), 1st set of M code
Corresponds to M function strobe 2 (MF2), 2nd set of M code
Corresponds to M function strobe 3 (MF3), 3rd set of M code
Corresponds to M function strobe 4 (MF4), 4th set of M code

(Note 2) During operation with miscellaneous function lock (AFL signal ON), the "M function strobe" (MF1, MF2, MF3, MF4) will not be output. However, this signal will be output when the M code is commanded independently (M00, M01, M02, M30).

(Note 3) Since M98 (read of subprogram call), M99 (return from subprogram), etc. are handled within the controller, "M function strobe" is not output.

(Note 4) The "M function strobe" will not be output when the M function is output if the "M function finish 1" signal (FIN1) or "M function finish 2" signal (FIN 2) is ON.

An example of the timing chart for the M function strobe signal (MF1, MF2 and MF3) is shown below.



Point: The following points must be observed in the sequence process.

(a) When the M function is commanded, the MFn and M code data n is output.

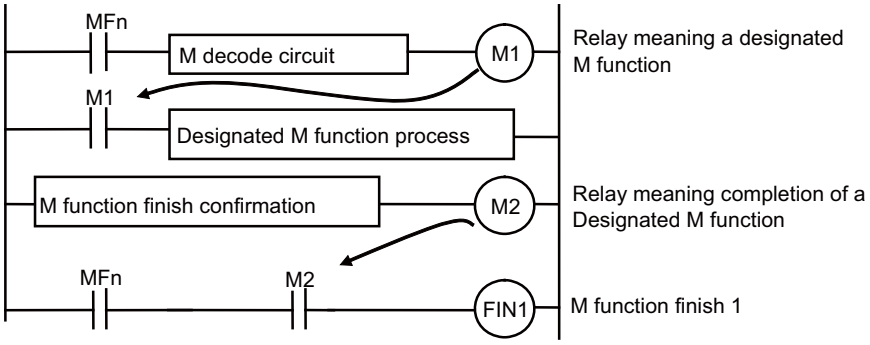
(b) MFn is always the trigger in the sequence process to start the M function process.

(c) When the designated M function process is completed, the "M function finish" signal is returned to the controller.

(d) The controller waits for the rising of the M function finish signal and then turns MFn OFF.

(e) MFn OFF is confirmed in the sequence process and then the "M function finish" signal is turned OFF. This completes the series of M function processes.

Handshaking with the controller and an accurate sequence process possible if the Mfn conditions are inserted at the M function start and completed signals.



[High-speed method (if parameter "#1278 ext14/bit1"= "1")]

Refer to the Miscellaneous Function Command High-speed Output : M function finish 1 to 4 signals (MFIN 1 to 4).

[Related signals]

(1) M function strobe 2 (MF2:XC61)
(2) M function strobe 3 (MF3:XC62)
(3) M function strobe 4 (MF4:XC63)
(4) M function finish 1 (FIN1:YC1E)
(5) M function finish 2 (FIN2:YC1F)
(6) M code data 1 to 4 (R504 to 11)
(7) Miscellaneous Function Command High-speed Output : M function finish 1 to 4(MFIN1 to 4:YD28 to B)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M FUNCTION STROBE 2	MF2	XC61	XDA1	XEE1	X1021	X1161	X12A1	X13E1	X1521

[Function]

This signal informs that the 2nd set of M function (M code) is specified in automatic operation.

[Operation]

The signal turns ON when:

(1) Two or more M function commands (M code) are specified for one block in automatic operation (memory, MDI or tape mode).

The signal turns OFF when:

(1) "M function finish 1" signal (FIN1) or "M function finish 2" signal (FIN2) turns ON.

(2) Reset condition occurs.

Other details are the same as those of "M function strobe 1" signal (MF1).Refer to "M function strobe 1".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M FUNCTION STROBE 3	MF3	XC62	XDA2	XEE2	X1022	X1162	X12A2	X13E2	X1522

[Function]

This signal informs that the 3rd set of M function (M code) is specified in automatic operation.

[Operation]

The signal turns ON when:

(1) Three or more M function commands (M code) are specified for one block in automatic operation (memory, MDI or tape mode).

The signal turns OFF when:

(1) "M function finish 1" signal (FIN1) or "M function finish 2" signal (FIN2) turns ON.

(2) Reset condition occurs.

Other details are the same as those of "M function strobe 1" signal (MF1).

Refer to "M function strobe 1".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M FUNCTION STROBE 4	MF4	XC63	XDA3	XEE3	X1023	X1163	X12A3	X13E3	X1523

[Function]

This signal informs that the 3rd set of M function (M code) is specified in automatic operation.

[Operation]

The signal turns ON when:

(1) Three or more M function commands (M code) are specified for one block in automatic operation (memory, MDI or tape mode).

The signal turns OFF when:

(1) "M function finish 1" signal (FIN1) or "M function finish 2" signal (FIN2) turns ON.

(2) Reset condition occurs.

Other details are the same as those of "M function strobe 1" signal (MF1).Refer to "M function strobe 1".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	S FUNCTION STROBE 1 to 8	SF1 to 4 SF5 to 8	XC64 to 7 XC70 to 3	XDA4 to 7 XDB0 to 3	XEE4 to 7 XEF0 to 3	X1024 to 7 X1030 to 3	X11634 to 7 X1170 to 3	X12A3 to 7 X12B0 to 3	X13E3 to 7 X13F0 to 3	X1523 to 7 X1530 to 3

[Function]

This signal informs that S (spindle) function (S code) is specified in automatic operation (memory, MDI or tape mode) machining program or by manual numerical command input.

The spindle function is also called the S function, and is used to command the spindle speed.

With the signal, user PLC receives S code data (1 to 8) respectively.

[Operation]

[Normal method (if parameter "#1278 ext14/bit1"= "0")]

The signal turns ON when:

(1) S function (S code) is specified in automatic operation (memory, MDI or tape mode).

(2) S function is specified by manual numerical command input.

The signal turns OFF when:

(1) "M function finish 1" signal (FIN1) or "M function finish 2" signal (FIN2) turns ON.

(2) Reset condition occurs.(Refer to the "In automatic operation "run"" signal (OP) section for details on the reset conditions.)

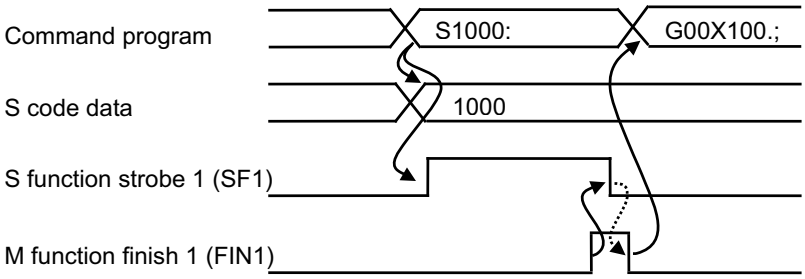
(Note 1) The S function strobe is not output during operation with M function lock (AFL signal ON).

(Note 2) When the S function is commanded, the "Spindle gear shift" signal (GR1, GR2) and "S command no gear selected" signal (SNGE) are output in addition to this signal (SFn). Refer to the sections of each signal for details.

(Note 3) By combining this signal (SFn), "Spindle gear selection code 1,2" signal (GI1, GI2) and "Gear shift completion" signal (GFIN), the data can be converted into S command data.(Data is transferred when the spindle controller is the high-speed serial connection specification type.)

(Note 4) The “S function strobe1 to 8” signals (SF1 to 8) correspond to spindle function (S code) commands to the 1st to 8th spindles respectively.

An example of the timing chart for the "S function strobe" signal (SF1) is shown below.



[High-speed method (if parameter "#1278 ext14/bit1"= "1")]

Refer to the Miscellaneous Function Command High-speed Output : S function finish signals (SFIN 1).

[Related signals]

(1) S code data 1 to 8(R512 to 27)

(2) Spindle gear shift (GR1, GR2:X1885, 6)

(3) S command no gear selected (SNGE:X1884)

(4) Spindle gear selection code 1,2 (GI1, GI2:Y1890, Y1891)

(5) Gear shift completion (GFIN:Y1885)

(6) M function finish 1 (FIN1:YC1E)

(7) M function finish 2 (FIN2:YC1F)

(8) Miscellaneous Function Command High-speed Output : S function finish 1 to 8(SFIN1 to 4, SFIN5 to 8:YD2C to F, YD38 to B)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	T FUNCTION STROBE 1 to 4	TF1 to 4	XC68 to B	XDA8 to B	XEE8 to B	X1028 to B	X1168 to B	X12A8 to B	X13E8 to B	X1528 to B

[Function]

This signal informs that the tool function (T code) is specified in automatic operation (memory, MDI or tape mode) machining program or by manual numerical command input.

The tool function is also called the T function, and is used to command the tool No. In the lathe specification controller, the tool compensation (tool length compensation, tool nose wear compensation) Nos. are also indicated.

The user PLC receives the T code data 1 to 4 with this signal.

[Operation]

[Normal method (if parameter "#1278 ext14/bit1"= "0")]

The signal turns ON when:

(1) The T function (T code) is specified in automatic operation (memory, MDI or tape mode).

(2) T function (T) is specified by manual numerical command input.

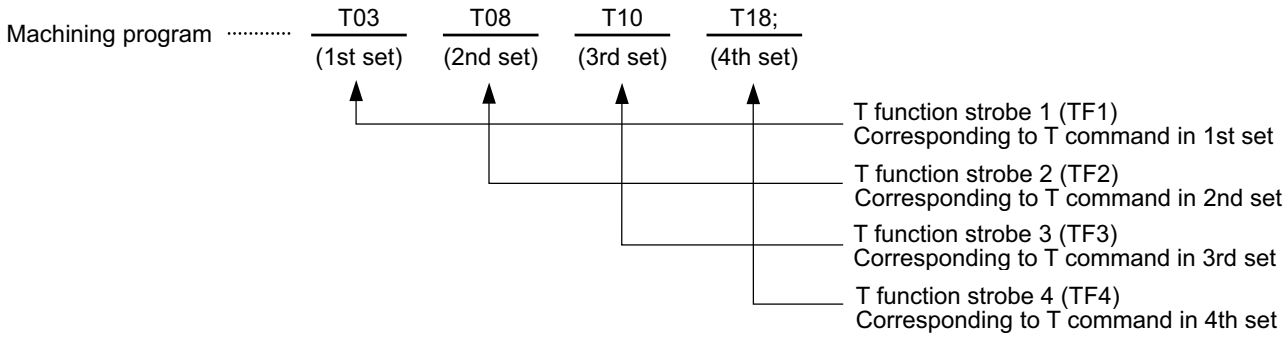
The signal turns OFF when:

(1) "M function finish 1" signal (FIN1) or "M function finish 2" signal (FIN2) turns ON.

(2) Reset condition occurs.(Refer to the "In automatic operation "run" signal (OP) section for details on the reset conditions.)

(Note 1) Up to four T commands can be issued in one block.

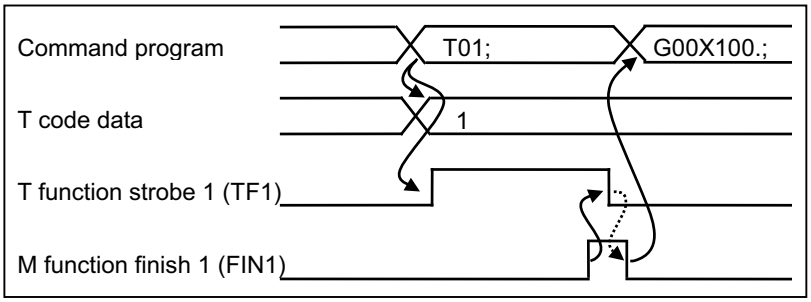
The relationship between machining program and T function strobe is shown below.



(Note 2) The "T function strobe 1 to 4" (TF1 to 4) is not output during operation with the M function lock (AFL signal ON).

(Note 3) Outputs from manual numerical command always correspond to the "T function strobe 1".

An example of the timing chart for the "T function strobe 1" signal (TF1) is shown below.



[High-speed method (if parameter "#1278 ext14/bit1"= "1")]

Refer to the Miscellaneous Function Command High-speed Output : T function finish 1 to 4 signals (TFIN 1 to 4).

[Related signals]

(1) T code data 1 to 4(R536 to 43)

(2) M function finish 1 (FIN1:YC1E)

(3) M function finish 2 (FIN2:YC1F)

(4) Miscellaneous Function Command High-speed Output : T function finish 1 to 4(TFIN1 to 4:YD30 to 3)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	2ND M FUNCTION STROBE 1 to 4	BF1 to 4	XC6C to F	XDAC to F	XEEC to F	X102C to F	X116C to F	X12AC to F	X13EC to F	X152C to F

[Function]

This signal informs that the 1st set of 2nd M function is selected in automatic operation (memory, MDI or tape) machining program or by manual numerical command input.

The 2nd M function is also called the B function.

With the signal (BF1), user PLC receives 2nd M function data 1 to 4.

[Operation]

[Normal method (if parameter "#1278 ext14/bit1"= "0")]

The signal turns ON when:

(1) The 2nd M function (B code) is specified in automatic operation (memory, MDI or tape).

(2) 2nd M function (B code) is issued by manual numerical command input.

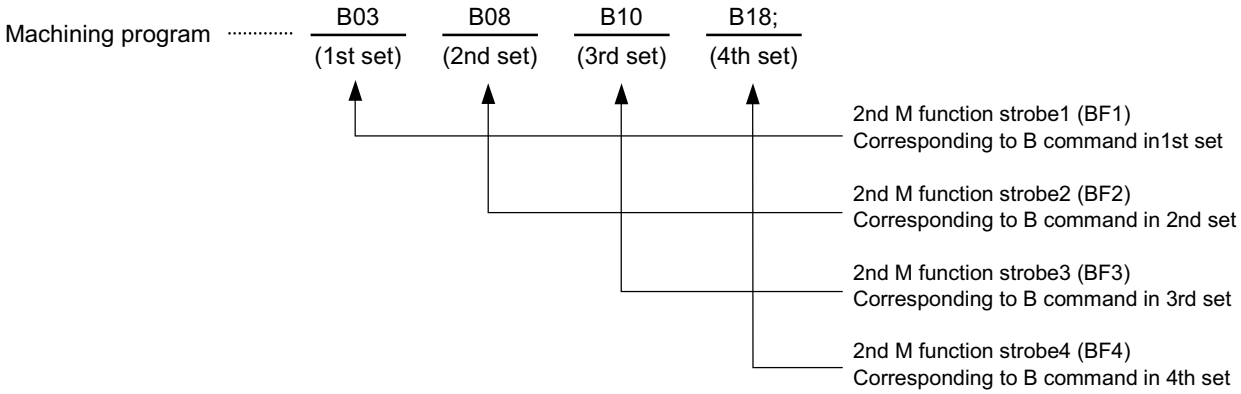
The signal turns OFF when:

(1) "M function finish 1" signal (FIN1) or "M function finish 2" signal (FIN2) is turned ON.

(2) Reset condition occurs.(Refer to the "In automatic operation "run"" signal (OP) section for details on the reset conditions.)

(Note 1) Four 2nd M functions can be issued in one block at a time.

The relationship between machining program and 2nd M function strobe is shown below.



(Note 2) The "2nd M function strobe 1 to 4" (BF1 to 4) is not output during operation with M function lock (AFL signal ON).

(Note 3) In the case of manual numerical command input, outputs are in accordance with "2nd M function strobe 1" (BF1).

(Note 4) Address for 2nd M function can be selected from addresses A, B and C by using machine parameter. Set so that the address is different from the axis address.

[High-speed method (if parameter "#1278 ext14/bit1"= "1")]

Refer to the Miscellaneous Function Command High-speed Output : 2nd M function finish 1 to 4 signals (BFIN 1 to 4).

[Related signals]

(1) M function finish 1 (FIN1:YC1E)

(2) M function finish 2 (FIN2:YC1F)

(3) Miscellaneous Function Command High-speed Output : 2nd M function finish 1 to 4(BFIN1 to 4:YD34 to 7)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CHOPPING COMPENSATION UPDATED PREVENTED	CHPRCC	XC7F	XDBF	XEFF	X103F	X117F	X12BF	X13FF	X153F

[Function]

This signal indicates that the machine is in the state where it does not update the chopping compensation amount.

[Operation]

While this signal is turned ON:

- The chopping compensation amount is not updated.
- The stroke compensation completion signal does not OFF.

When the control data is updated, turn this signal OFF and then update the chopping compensation amount.

[Related signals]

(1) Chopping compensation update prevention request (CHPRCR:YCD7)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN CHOPPING START	CHOP	XC80	XDC0	XF00	X1040	X1180	X12C0	X1400	X1540

[Function][Operation]

This signal turns ON in the state of chopping start.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	BASIC POSITION→ UPPER DEAD POINT PATH FLAG	CHP1	XC81	XDC1	XF01	X1041	X1181	X12C1	X1401	X1541

[Function][Operation]

This signal turns ON while moving from the basic position to the upper dead center point.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	UPPER DEAD POINT → BOTTOM DEAD POINT PATH FLAG	CHP2	XC82	XDC2	XF02	X1042	X1182	X12C2	X1402	X1542

[Function][Operation]

This signal turns ON while moving from the upper dead center point to the bottom dead center point.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	BOTTOM DEAD POINT → UPPER DEAD POINT PATH FLAG	CHP3	XC83	XDC3	XF03	X1043	X1183	X12C3	X1403	X1543

[Function][Operation]

This signal turns ON while moving from the bottom dead center point to the upper dead center point.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	UPPER DEAD POINT → BASIC POSITION PATHBASIC POSITION PATH	CHP4	XC84	XDC4	XF04	X1044	X1184	X12C4	X1404	X1544

[Function][Operation]

This signal turns ON while moving from the upper dead center point to the basic position.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	IN CHOPPING MODE	CHPMD	XC85	XDC5	XF05	X1045	X1185	X12C5	X1405	X1545

[Function][Operation]

This signal turns ON in the state of chopping mode.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	STROKE COMPENSATION COMPLETION		XC86	XDC6	XF06	X1046	X1186	X12C6	X1406	X1546

[Function][Operation]

This signal turns ON when the difference between the commanded stroke and the actual stroke has reached the tolerance specified with the parameter (#2080 chwid) as a result of compensation of the commanded position.
When speed fluctuates, such as when movement is stopped or chopping control data is changed, this signal is turned OFF.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL ESCAPE AND RETURN TRAN-SIT POINT RECOGNITION COMPLETED		XC87	XDC7	XF07	X1047	X1187	X12C7	X1407	X1547

[Function]

With the tool escape and return function, a transit point can be designated by pressing the transit point switch while tool escapes. The tool returns to the machining halted point, passing through the transit point designated.
This signal notifies that NC memorized the transit point.

[Operation]

Refer to the section on "In tool escape and return mode signal" (XC4A).

[Related signals]

(1) In tool escape and return mode (XC4A)
(2) Tool escape and return transit point designation (YC8D)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SEARCH & START ERROR	SSE	XC8A	XDCA	XF0A	X104A	X118A	X12CA	X140A	X154A

[Function]

This signal is output when the program No. to be searched with search & start is illegally designated.

[Operation]

This signal is output when the No. of the program to be searched with search & start is illegal. Automatic operation start will not be carried out if this signal is output. This signal will turn OFF if the program No. is correctly input to execute search & start again, or when the reset signal is issued.
Refer to the "Search & start" signal (RSST) for details.
When the multi-part system program management is valid, the signal for $1 is output as common signal for all part systems.

[Related signals]

(1) Search & start (RSST:YC31)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SEARCH &START SEARCH	SSG	XC8B	XDCB	XF0B	X104B	X118B	X12CB	X140B	X154B

[Function]

This signal is output when searching for a program is started with search & start.

[Operation]

Informs the PLC that the NC is searching for the program with search & start.
Hold the "search & start" signal until the "search & start (search)" signal turns ON.
If the No. of the program to be searched is illegal, the "search & start (error)" signal (SSE) will be output.
When the multi-part system program management is valid, the signal for $1 is output as common signal for all part systems.

[Related signals]

(1) Search & start program No. (R2562, 2563)
(2) Search & start Error (SSE:XC8A)
(3) Search & start (RSST:YC31)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL CHANGE POSITION RETURN COMPLETION	TCP	XC93	XDD3	XF13	X1053	X1193	X12D3	X1413	X1553

[Function]

This signal notifies that the axis commanded with the tool change position return command has completed return to the tool change position.

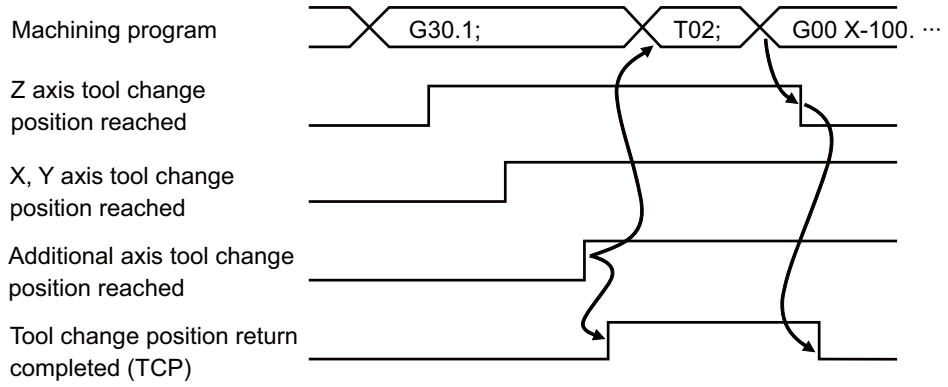
[Operation]

This signal turns ON when all axes commanded with the tool change position return command (G30.n) have moved to the tool change position. This signal turns OFF when even one of the axes moved to the tool change position with the command has moved from the tool change position.

Refer to the Programming Manual for details on the tool change return command.

[Timing chart]

Example: When G30.1 command, additional axis tool change position return is valid


Machining program
G30.1;
T02;
G00 X-100. ···
Z axis tool change position reached
X, Y axis tool change position reached
Additional axis tool change position reached
Tool change position return completed (TCP)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NEW TOOL CHANGE	TCRQ	XC94	XDD4	XF14	X1054	X1194	X12D4	X1414	X1554

[Function]

This signal notifies that a new tool (unused tool) in the group is selected in the tool life management II.

[Operation]

The signal turns ON when:

(1) The tool selected by T command tool selection is unused (status 0).

The signal turns OFF when:

(1) When T command is completed due to the M function finish signal (FIN1, FIN2).

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LIFE PREDICTION		XC96	XDD6	XF16	X1056	X1196	X12D6	X1416	X1556

[Function]

This signal notifies when remaining data, which is calculated by subtracting usage data from service life data, has reached its remaining life set value.

[Operation]

The life prediction is valid when the basic specification parameter "#1277 ext13 bit1" is 1. The signal will not be output when the remaining life data is 0 or larger than the life data.

Signal output judgment condition varies depending on the following parameter setting.

#1277 ext13 bit2 Switching the timing of the life prediction signal output

0: "Life data - usage data = remaining life data"

1: "Life data - usage data ≦ remaining life data"

#1277 ext13 bit3 Tool for which the life prediction signal is output

0: The signal is output for each tool.

1: The signal is output for the last tool of a group.

The signal turns ON when:

(1) Remaining life (life data - usage data) of the tool has reached to its remaining life setting value. (Same timing as count up of usage data)

(2) Remaining life (life data - usage data of the tool has reached to its remaining life setting value at the time of tool selection. (Same timing as TF output)

The signal turns OFF when:

(1) Group selection has completed. (At T command. Note that if the next selected group has a condition of turning ON the signal, the signal remains ON.)

(2) Tool has reached to its lifetime. (Same timing as count up of usage data)

(3) The usage data for the group currently selected is cleared. (In case that "tool change reset signal" (TRST) is input, etc.)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NC ALARM 1	AL1	XC98	XDD8	XF18	X1058	X1198	X12D8	X1418	X1558

[Function]

This signal informs that system error occurred in the controller.

[Operation]

If "watch dog error", "memory parity check error", etc. occurs on the controller side, the signal turns ON.

The system error can be reset by turning OFF.

(Note 1) "NC alarm 1" (AL1) may not be detected as signal.

(Note 2) For details of system alarms, refer to the relevant Instruction Manual or Setup Manual.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NC ALARM 2 (Servo alarm)	AL2	XC99	XDD9	XF19	X1059	X1199	X12D9	X1419	X1559

[Function]

This signal informs that the controller is in servo alarm condition.

If servo alarm occurs, "Servo ready completion" signal (SA) turns OFF.

[Operation]

The signal turns ON when:

(1) Servo alarm occurs. Servo alarms include the following:

- Servo failure 1 (no signal, overcurrent, overvoltage, etc.)
- Servo failure 2 (motor overheat, excessive error, drive unit external emergency stop, etc.)
- Initial parameter error (parameter transferred to drive unit when the power is turned ON is illegal)
- Drive unit not mounted (cable is not connected between controller and servo controller).
- Parameter error (a parameter that will disrupt movement of the control axis was found).

Alarm can be reset by turning OFF the power, or using controller reset, or by setting parameter again, etc., depending on type of alarm.

For details of alarm resetting, and servo alarm, refer to the relevant Instruction Manual or Setup Manual.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NC ALARM 3 (Program error)	AL3	XC9A	XDDA	XF1A	X105A	X119A	X12DA	X141A	X155A

[Function]

This signal informs that the controller is in program error condition.

[Operation]

This type of alarm occurs during automatic operation in memory, MDI or tape mode, mainly due to use of faulty machining program, or program incompatible with the controller specifications.

Some typical examples of program error are shown below. For details, refer to the relevant Instruction Manual or Setup Manual.

(1) Illegal address (address not covered by the specifications is used)

(2) Absence of F command

(3) Arc end point excessive deviation

(4) Return incomplete axis found (a motion command was issued to an axis that has not completed reference position return)

(5) Program end error (M02 or M30 command is not inserted or reset & rewind process has not been performed)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NC ALARM 4 (Operation error)	AL4	XC9B	XDDB	XF1B	X105B	X119B	X12DB	X141B	X155B

[Function]

This signal informs that the controller is in operation error condition.

[Operation]

The signal turns ON in case of operation alarm, and OFF when the alarm condition is removed.

Some typical examples of operation errors are shown below. For details, refer to the relevant Instruction Manual or Setup Manual.

(1) Hardware axis motion stroke end
(2) Software axis motion stroke end
(3) No operation mode set
(4) Cutting feedrate override set to "zero"
(5) Manual feedrate zero
(6) External interlock axis found
(7) Warning regarding absolute position detection

(Note) When the "NC alarm 5" (XCB1) is valid, the following alarms are not output to the "NC alarm 4".

Error No.	Details
0004	External interlock
0102	Cutting override zero
0103	External feed speed zero
0109	Block start interlock
0110	Cutting block start interlock
0125	Rapid traverse override zero
1033	Spindle-Spindle polygon (G51.2) cutting interlock

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NC WARNING (SERVO WARNING)	WR1	XC9C	XDDC	XF1C	X105C	X119C	X12DC	X141C	X155C

[Function]

This signal notifies that the servo waring (S52) occurs in the drive unit.

[Operation]

(1) For servo drive unit

This signal turns ON when:

- There is more than one axis within the part system where the warning occurs in the servo drive unit.

This signal turns OFF when:

- There is no axis within the part system where the warning occurs in the servo drive unit.

(2) For spindle/PLC axis drive unit

When the warning occurs, the signal for the 1st part system is output.

(Note) This signal is not output if the servo warning "S52 Control axis detach warning 00E6" or "S52 In NC emergency stop state 00E7" occurs.

[Related signals]

(1) Servo alarm/warning No. (R5332 to R5339)
(2) Spindle alarm/warning No. (R6529)
(3) PLC axis alarm warning No. n-th axis (R168 to R173)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : TEACHING/MONITOR MODE IN EXECUTION		XCA0	XDE0	XF20	X1060	X11A0	X12E0	X1420	X1560

[Function]

This signal indicates that teaching or monitor is being executed.

[Operation]

This signal turns ON when the teaching/monitor execution signal is input.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching mode valid, Monitor mode valid (XCA1, XCA2)
(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)
(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC3 to YCC7)
(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)
(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : TEACHING MODE VALID		XCA1	XDE1	XF21	X1061	X11A1	X12E1	X1421	X1561

[Function]

This signal indicates that the teaching mode is selected.

[Operation]

This signal turns ON when the teaching mode signal is input.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Monitor mode valid (XCA0, XCA2)
(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)
(3) Load monitor I : Teaching/Monitor mode In execution, Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC3 to YCC7)
(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)
(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : MONITOR MODE VALID		XCA2	XDE2	XF22	X1062	X11A2	X12E2	X1422	X1562

[Function]

This signal indicates that the monitor mode is selected.

[Operation]

This signal turns ON when the monitor mode signal is input.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid (XCA0, XCA1)
(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)
(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC3 to YCC7)
(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)
(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : ADAPTIVE CONTROL IN EXECUTION		XCA3	XDE3	XF23	X1063	X11A3	X12E3	X1423	X1563

[Function]

This signal indicates that adaptive control is selected.

[Operation]

This signal turns ON when the adaptive control execution signal is turned ON during monitor execution.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Adaptive control execution (YCC9)

(2) Load monitor I : Adaptive control override (R571)

(3) Load monitor I : Adaptive control basic axis selection (R2983)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TAP RETRACT POSSIBLE	TRVE	XCA5	XDE5	XF25	X1065	X11A5	X12E5	X1425	X1565

[Function]

This signal informs that tap retract is possible, and is output if operation is stopped during tap cycle execution.

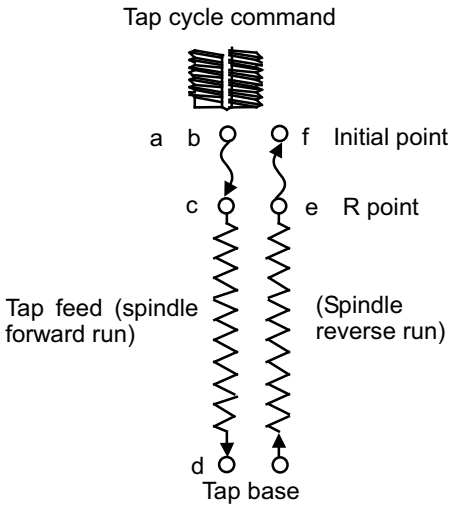
The "Tap retract" signal (TRV) will be valid when this signal (TRVE) is ON.

(Note) When the parameter "#1234 set06/bit3" is set to "0", the axis movement before starting the tap retract becomes the interlock state by turning this signal ON. To cancel the interlock state, input the "Tap retract possible state cancel" signal (TRVEC) and then turn this signal OFF.

[Operation]

(1) This signal turns ON when tap cycle is stopped in the cutting feed area (between c-d-e in the drawing) due to the following causes:

- Emergency stop.
- Reset stop.
- Power OFF (only in absolute position detection system).



(2) This signal turns OFF in the following cases:

- Tap retract is executed and completed.
- The target axis for the tap retract is moved automatically or with manual mode.
  However, it is moved only when the following conditions are met:
  - The parameter "#1234 set06/bit3" is set to "1".
  - The "Tap retract" (TRV) is OFF.
  - The target axis for the tap retract is stopped.
- After confirming the rising edge of the "Tap retract possible state cancel" (TRVEC).

[Caution]

If the parameter "#1234 set06/bit3" is set to "0", the axis movement which has been operated with the automatic operation/manual operation before starting the tap retract becomes interlocked when turning this signal ON. To cancel the interlocked state, turn the "Tap retract possible state cancel" (TRVEC) ON and then turn this signal OFF.

[Related signals]

(1) Tap retract (TRV:YC5C)

(2) Tap retract possible state cancel (TRVEC:YCD6)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NO. OF WORK MACHINING OVER	PCNT	XCA6	XDE6	XF26	X1066	X11A6	X12E6	X1426	X1566

[Function]

This signal is output when the No. of work machining matches or exceeds the maximum No. of work machining.

[Operation]

This signal turns ON when the No. of work machining matches or exceeds the maximum work value (WRK LIMIT) set in the [Process parameter] screen.

(Note 1) This signal turns ON when the No. of work machining matches or exceeds the maximum work value regardless of the count up by the controller or user PLC.

(Note 2) This signal is not output when "0" is set for the maximum work value.

[Related signals]

(1) No. of work machining (current value) (R606, 7)

(2) No. of work machining (maximum value) (R608, 9)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	ABSOLUTE POSITION WARNING	ABSW	XCA7	XDE7	XF27	X1067	X11A7	X12E7	X1427	X1567

[Function]

This signal notifies that the amount moved while the power is OFF has exceeded to the tolerable amount when using the absolute position detection system.

[Operation]

This signal turns ON when the difference of the machine position at power OFF and at power ON exceeds the tolerable value ([ABS. POSI PARAM] "#2051 check" setting value) when using the absolute position detection system.

(Note) The movement amount during power OFF depends on the "PON POS (power ON position)" and "POF POS (power OFF position)" on the [ABS SERVO MONITOR (absolute position monitor)] screen.

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	IN AXIS NAME SWITCH		XCA9	XDE9	XF29	X1069	X11A9	X12E9	X1429	X1569

[Function]

This signal informs that the axis name is being switched.

[Operation]

This signal turns ON by the axis name switch command (G111).

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	HOB MACHINING: RETRACTING	HOBRTM	XCAE	XDEE	XF2E	X106E	X11AE	X12EE	X142E	X156E

[Function]

This signal informs that hob retract operation is running.

[Operation]

This signal turns ON when:

(1) Retract operation started by hob machining: retract request during hob machining mode.

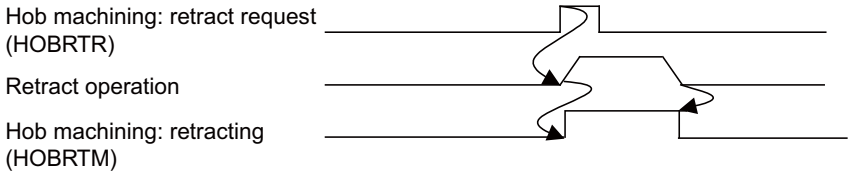
(2) Retract operation started by program error or operation error during hob machining mode.

This signal turns OFF when:

(1) Retract operation is finished.

(2) The power is turned OFF and ON.

(3) Retract operation is stopped due to reset or emergency stop.



[Related signals]

(1) Hob machining: retract request (HOBRTR:YCDE)

(2) Hob machining: retract amount selection (HOBRTV:YB20)

(3) Hob machining: retract complete (HOBRTF:XCAF)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	HOB MACHINING: RETRACT COM-PLETE	HOBRTF	XCAF	XDEF	XF2F	X106F	X11AF	X12EF	X142F	X156F

[Function]

This signal informs that hob retract operation has been finished.

[Operation]

This signal turns ON when:

(1) Retract by hob machining: retract request (HOBRTR) is conducted during hob machining mode and the retract operations for all axes are finished.

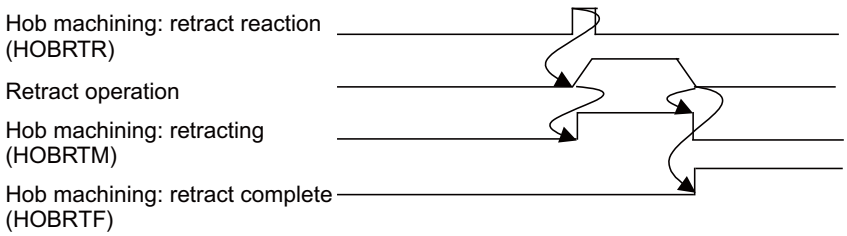
(2) Program error or operation error is executed during hob machining mode and the retract operations for all axes are finished.

This signal turns OFF when:

(1) The power is turned OFF and ON.

(2) Reset or emergency stop is input, or automatic operation is restarted.

(3) Retract axis moves.


Hob machining: retract reaction (HOBRTR)
Retract operation
Hob machining: retracting (HOBRTM)
Hob machining: retract complete (HOBRTF)

[Related signals]

(1) Hob machining: retract request (HOBRTR:YCDE)

(2) Hob machining: retract amount selection (HOBRTV:YB20)

(3) Hob machining: retracting (HOBRTM:XCAE)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	IN SPINDLE-NC AXIS POLYGON MODE		XCB0	XDF0	XF30	X1070	X11B0	X12F0	X1430	X1570

[Function]

This signal informs the PLC that polygon machining (spindle-NC axis) mode is entered.

(Note) Refer to the "In spindle-spindle polygon mode" signal for details on the spindle-spindle polygon.

#1501 polyax ≠ 0: Polygon machining (spindle-NC axis)

#1501 polyax = 0: Spindle-spindle polygon (spindle-spindle)

[Operation]

This signal turns ON by the polygon machining start command (G51.2), and is held during the polygon machining mode.

This signal turns OFF when the polygon machining mode is canceled (G50.2, reset, etc.), and remains OFF in modes other than the polygon machining mode.

[Related signals]

(1) In spindle-spindle polygon mode (XCB2)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	NC ALARM 5	AL5	XCB1	XDF1	XF31	X1071	X11B1	X12F1	X1431	X1571

[Function]

This signal informs that the controller is in operation alarm (error) condition.

[Operation]

The signal turns ON when:

(1) The parameter "#1238 set10/bit7" is ON and the operation alarms below occur.

The signal turns OFF when:

(1) The parameter "#1238 set10/bit7" is OFF.

(2) The parameter "#1238 set10/bit7" is ON and the operation alarm conditions below do not exist.

For details on the operation alarms, refer to "Alarm/Parameter Manual".

<Operation alarms output to NC alarm 5>

- External interlock (M01 0004)
- Override zero (M01 0102)
- External feed speed zero (M01 0103)
- Block start interlock (M01 0109)
- Cutting block start interlock (M01 0110)
- Rapid traverse override zero (M01 0125)
- Spindle-spindle polygon (G51.2) cutting interlock (M01 1033)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	IN SPINDLE-SPINDLE POLYGON MODE		XCB2	XDF2	XF32	X1072	X11B2	X12F2	X1432	X1572

[Function]

This signal informs that the spindle-spindle polygon machining mode is being executed.

(Note) Refer to the explanation of "In Spindle-NC axis polygon mode" signal for details on the spindle-NC axis polygon.

#1501 polyax ≠ 0: Polygon machining (spindle-NC axis)

#1501 polyax = 0: Spindle-spindle polygon (spindle-spindle)

[Operation]

The signal turns ON when:

(1) The G51.2 is commanded, and the spindle-spindle polygon machining is executed.

The signal turns OFF when:

(1) The G50.2 is commanded, and the spindle-spindle polygon machining is canceled.

(2) The "Spindle synchronization cancel" signal is input, and the spindle-spindle polygon machining is canceled.

(3) "Emergency stop" occurs.

(4) "Reset" is input.

When this signal turns ON and the spindle-spindle polygon synchronization is completed, "spindle-spindle polygon synchronization completion" signal turns ON.

[Related signals]

(1) Spindle-spindle polygon cancel (YCD1)

(2) Spindle-spindle polygon synchronization completion (XCB3)

(3) In Spindle-NC axis polygon mode (XCB0)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	SPINDLE-SPINDLE POLYGON SYN-CHRONIZATION COMPLETION		XCB3	XDF3	XF33	X1073	X11B3	X12F3	X1433	X1573

[Function]

This signal informs that the workpiece spindle and rotary tool spindle are in the synchronized rotation state.

[Operation]

The signal turns ON when:

(1) The rotary tool spindle rotation speed, in respect to the rotation speed following the rotary tool spindle and workpiece spindle rotation ratio command, reaches the value set for the spindle-spindle polygon synchronization rotation speed attainment level during the spindle-spindle polygon machining mode.

The signal turns OFF when:

(1) The rotary tool spindle rotation speed, in respect to the rotation speed following the rotary tool spindle and workpiece spindle rotation ratio command, deviates from the value set for the spindle-spindle polygon synchronization rotation speed attainment level during the spindle-spindle polygon machining mode.

(2) The spindle-spindle polygon synchronization mode is canceled.

[Related signals]

(1) Spindle-spindle polygon cancel (YCD1)

(2) In spindle-spindle polygon mode (XCB2)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	IN 3-DIMENSIONAL COORDINATE CONVERSION		XCB9	XDF9	XF39	X1079	X11B9	X12F9	X1439	X1579

[Function]

This signal notifies that the controller is in 3-dimensional coordinate conversion.

[Operation]

This signal turns ON when:

(1) G68 (3-dimensional coordinate conversion) is commanded

This signal turns OFF when:

(1) G69 (3-dimensional coordinate conversion cancel) is commanded

(2) G68 (3-dimensional coordinate conversion) modal is cleared by reset

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	N SYNCHRONIZED TAPPING SELECTION (M COMMAND)	RTAP	XCC0	XE00	XF40	X1080	X11C0	X1300	X1440	X1580

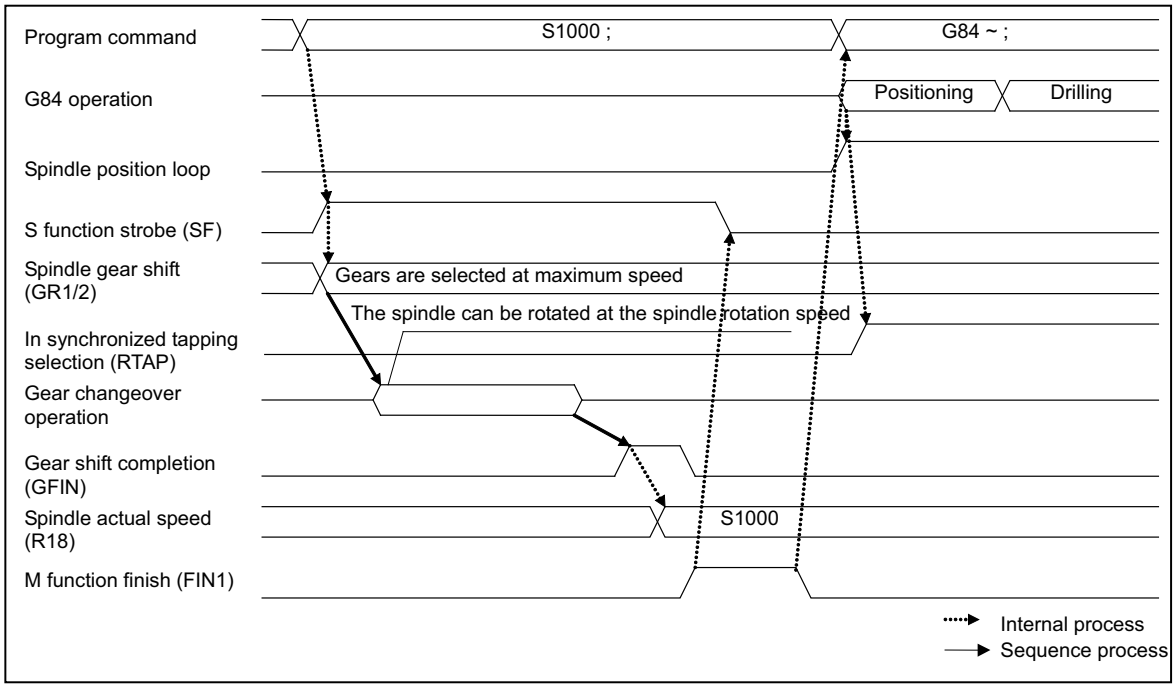
[Function]

This signal informs that the synchronized tapping mode is active.

(This signal is output only when the M function synchronized tapping cycle valid parameter (#1272 ext08 bit1) is ON.)

[Operation]

(1) ON timing

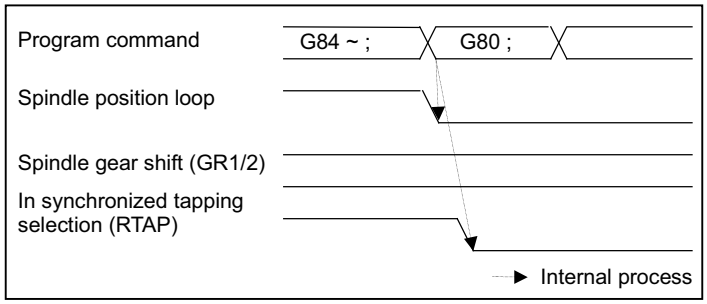


(Note 1) Spindle position loop and in synchronized tapping selection turn ON only during synchronized tapping.

(Note 2) If synchronized tapping is applied even during tap retract, "in synchronized tapping selection" signal will turn ON.

(2) OFF timing

This signal turns OFF when reset, G80 (hole drilling fixed cycle cancel), 01 group G codes or other fixed cycle G codes are commanded.



(Note 1) The gears are not selected until the S command is issued again.

(Note 2) This signal turns OFF when tap retract is canceled or completed.

[Related signals]

(1) Gear shift completion (GFIN:Y1885)

(2) Spindle actual speed (R6506)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	In small diameter deep hole cycle		XCC1	XE01	XF41	X1081	X11C1	X1301	X1441	X1581

[Function]

This signal outputs the state of "in drilling operation" of small diameter deep hole cycle.

[Operation]

This signal is output between the positioning to the R point for drilling axis and returning to the R point/initial point after finishing the drilling.

[Related signals]

(1) Small diameter deep hole drilling cycle (YCCA)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	HIGH-SPEED RETRACT FUNCTION VALID STATE		XCC2	XE02	XF42	X1082	X11C2	X1302	X1442	X1582

[Function]

This signal informs that the high-speed retract function is valid.

[Operation]

This signal turns ON when the high-speed retract function valid signal is ON.

This signal turns OFF when the high-speed retract function valid signal turns OFF, or when the high-speed retract function option is not provided.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) In High-speed retract function operation (XCC3)

(2) High-speed retract function valid (YCCC)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	IN HIGH-SPEED RETRACT FUNCTION OPERATION		XCC3	XE03	XF43	X1083	X11C3	X1303	X1443	X1583

[Function]

This signal informs that the high-speed retract function is in operation.

[Operation]

This signal turns ON when the high-speed retract function is valid, and a fixed cycle program (G81, G82, G83, G73), which carries out high-speed retract, is being executed. If this signal is ON while executing a fixed cycle program, high-speed retract operation will be executed.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) High-speed retract function valid state (XCC2)

(2) High-speed retract function valid (YCCC)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	IN BARRIER VALID (LEFT)		XCC8	XE08	XF48	X1088	X11C8	X1308	X1448	X1588

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	IN BARRIER VALID (RIGHT)		XCC9	XE09	XF49	X1089	X11C9	X1309	X1449	X1589

[Function]

This signal informs that the barrier area of left side (right side) is valid in the chuck/tailstock barrier function.

[Operation]

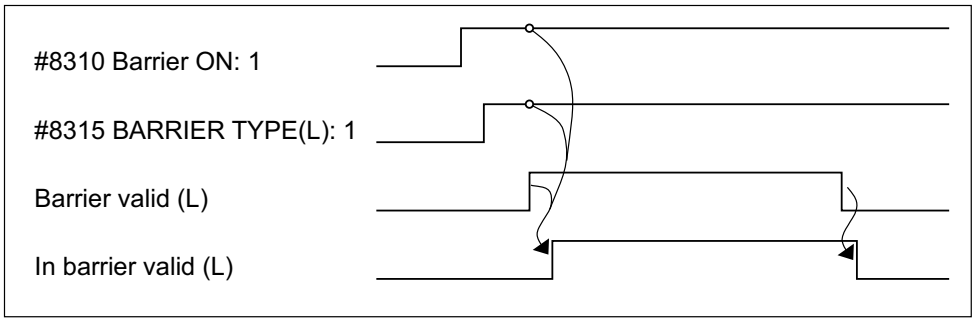
When all conditions below are satisfied and the barrier area is valid, this signal is turned ON. (When this signal is OFF, the barrier check is not executed.)

(1) The option of chuck barrier check function is valid.

(2) The setting of parameter "#8310 Barrier ON" on the barrier data screen is "1". (Excluding when using the special display unit)

(3) The setting of parameter "#8315 BARRIER TYPE (L)" ("#8316 BARRIER TYPE (R)") on the barrier data screen is other than "0".

(4) The "Barrier valid" signal input above is ON, or the G22 modal is valid.



[Related signals]

(1) Barrier valid (left) (YCD8)

(2) Barrier valid (right) (YCD9)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	DOOR OPEN ENABLE	DROPNS	XCD8	XE18	XF58	X1098	X11D8	X1318	X1458	X1598

[Function]

This signal informs the PLC that the drive power to all axes is turned OFF due to the "Door open I/II" (DOOR1/2) signal, or that the same status is canceled.

[Operation]

This signal turns ON when the drive power to all axes is turned OFF due to the "Door open I/II" (DOOR1/2) signal turning ON.

This signal turns OFF at all axes ready ON and at all servo axes servo ON, due to the "Door open I/II" (DOOR1/2) signal turning OFF.

Release of the door lock is enabled at the rising edge of the "Door open enable" signal.

The operation is in a READY status at the falling edge of the "Door open enable" signal.

[Caution]

(1) Handling of the PLC axis

Set so the "Door open I/II" (DOOR1/2) signal is output to the NC after the PLC axis is stopped by the PLC.

If the "Door open I/II" (DOOR1/2) signal is input without stopping the PLC axis, the axis will stop with a dynamic brake method due to the ready OFF state.

The remaining distance will be held in the R register being used in the PLC axis control.

(2) Handling of the analog spindle

When an analog spindle is connected, it is not possible to confirm that the spindle has completely stopped with the NC. Thus, confirm that the spindle has completely stopped using the PLC, before opening the door.

Because the spindle may start rotating again immediately after the door is closed, for safety turn the forward run and reverse run signals OFF when the door is open.

(3) Opening the door during ATC operation

When opening the door during ATC operation, apply an interlock with the user PLC.

[Related signals]

(1) Door open I (DOOR1:Y768)

(2) Door open II (DOOR2:YCE1)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	LOAD MONITOR I : CUTTING TORQUE ESTIMATION IN PROGRESS		XCEE	-	-	-	X11EE	X132E	X146E	X15AE

[Function]

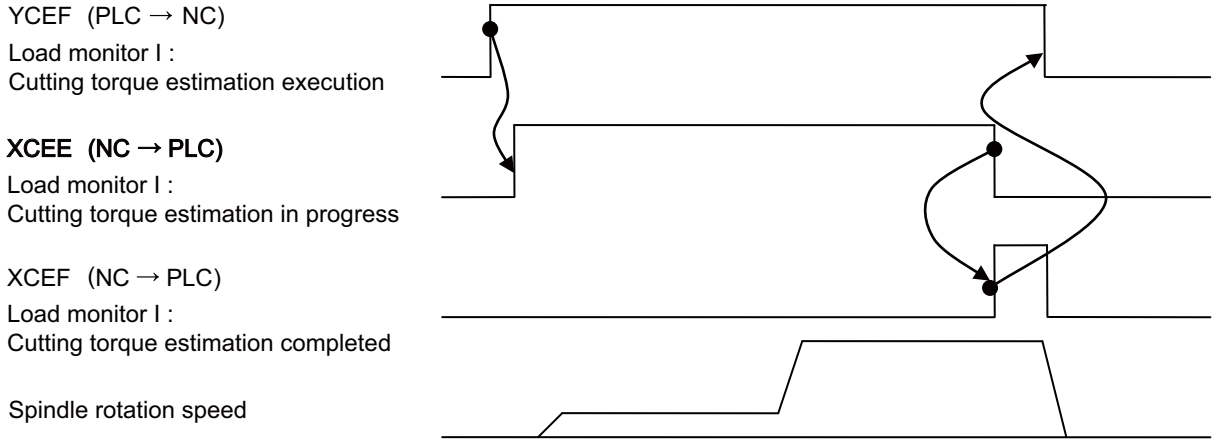
This signal notifies that cutting torque is being estimated.

[Operation]

(1) When the target axis for cutting torque estimation has been specified and when “Cutting torque estimation Execution” is input, this signal turns ON and the estimation begins.

(2) NC turns OFF the signal XCEE when the estimation is completed.

(3) If “Cutting torque estimation Execution” turns OFF during estimation, NC turns OFF XCEE to discontinue the estimation.


YCEF (PLC → NC)
Load monitor I :
Cutting torque estimation execution
XCEE (NC → PLC)
Load monitor I :
Cutting torque estimation in progress
XCEF (NC → PLC)
Load monitor I :
Cutting torque estimation completed
Spindle rotation speed

[Related signals]

(1) Load monitor I : Cutting torque estimation completed (XCEF)

(2) Load monitor I : Cutting torque estimation execution (YCEF)

(3) Load monitor I : Spindle cutting torque output value (R6528)

(4) Load monitor I : Cutting torque estimation target axis (R22692)

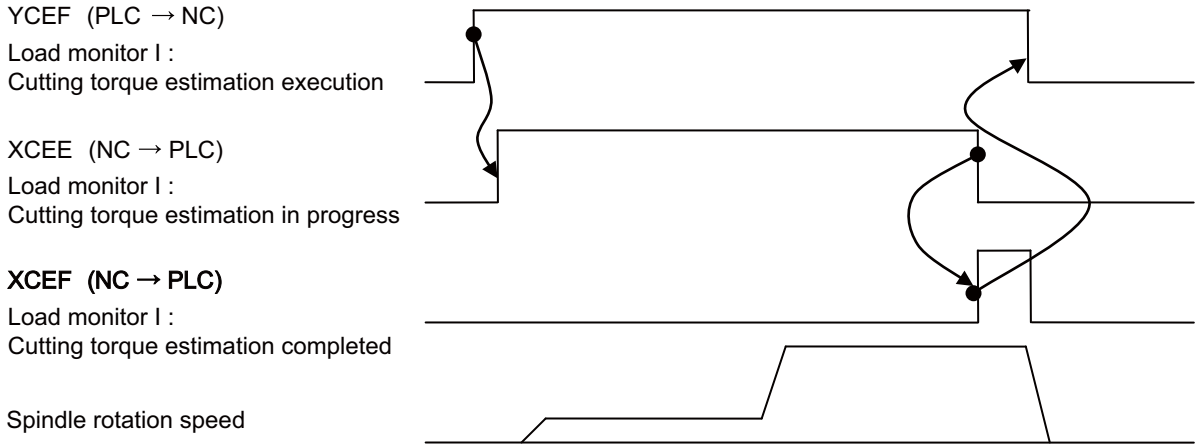
Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	LOAD MONITOR I : CUTTING TORQUE ESTIMATION COMPLETED		XCEF	-	-	-	X11EF	X132F	X146F	X15AF

[Function]

This signal informs that estimating cutting torque is complete.

[Operation]

When estimating cutting torque finishes after “Cutting torque estimation Execution” has been input, XCEF turns ON.
XCEF turns OFF at the falling edge of “Cutting torque estimation Execution”.


YCEF (PLC → NC)
Load monitor I :
Cutting torque estimation execution
XCEE (NC → PLC)
Load monitor I :
Cutting torque estimation in progress
XCEF (NC → PLC)
Load monitor I :
Cutting torque estimation completed
Spindle rotation speed

[Related signals]

(1) Load monitor I : Cutting torque estimation in progress (XCEE)
(2) Load monitor I : Cutting torque estimation execution (YCEF)
(3) Load monitor I : Spindle cutting torque output value (R6528)
(4) Load monitor I : Cutting torque estimation target axis (R22692)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TORQUE LIMITATION SKIP: G160 TORQUE LIMIT ON	GLMT	XCF9	XE39	XF79	X10B9	X11F9	X1339	X1479	X15B9

[Function]

This signal indicates that the torque skip ON occurred while the torque skip (G160) is commanded.

[Operation]

This signal turns ON when:

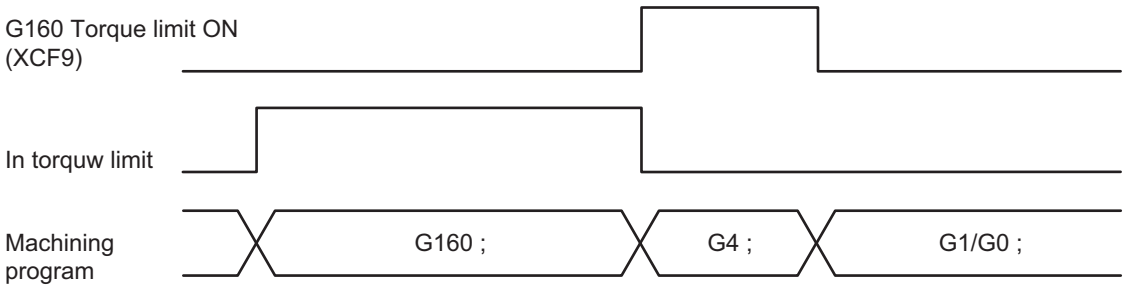
(1) The torque skip ON occurs while the torque skip (G160) is commanded.

This signal turns OFF when:

(1) The "Reset 1", "Reset 2", or "Reset & rewind" signal is input for the target part system.

(2) An emergency stop occurred.

(3) Axis motion is commanded for the target part system with a machining program in the next or later block for the target part system.



Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	RAPID TRAVERSE TIME CONSTANT : IN SWITCHOVER	G0AC	XD0B	XE4B	XF8B	X10CB	X120B	X134B	X148B	X15CB

[Function]

This signal indicates the currently selected rapid traverse time constant.

[Operation]

This signal turns ON when the rapid traverse time constant has already been switched to the axis specifications parameter "#2598 G0tL_2" or the rapid traverse time constant (primary delay) / second-step time constant for soft acceleration/deceleration has been switched to the axis specifications parameter "#2599 G0t1_2".

This signal turns OFF when the rapid traverse time constant has already been switched to the axis specifications parameter "#2004 G0tL" or the rapid traverse time constant (primary delay) / second-step time constant for soft acceleration/deceleration has been switched to the axis specifications parameter "#2005 G0t1".

[Related signals]

(1) Rapid traverse time constant : Switchover request (YD0B)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	Tool axis coordinate system in 3D manual feed (JOG,INC)	MJST	XD18	XE58	XF98	X10D8	X1218	X1358	X1498	X15D8
A	Table coordinate system in 3D manual feed (JOG,INC)	MJSB	XD19	XE59	XF99	X10D9	X1219	X1359	X1499	X15D9
A	Feature coordinate system in 3D manual feed (JOG,INC)	MJSF	XD1A	XE5A	XF9A	X10DA	X121A	X135A	X149A	X15DA

[Function]

This signal indicates the coordinate system in which the 3D manual feed is carried out by the jog or incremental feed.
When this signal is ON, jog feed or incremental feed is carried out in the coordinate system of the signal.

[Operation]

This signal turns ON when:

(1) The hypothetical coordinate system for the 3D manual feed (JOG, INC) has been selected during jog feed or incremental feed.

This signal turns OFF when:

(1) The hypothetical coordinate selection for the 3D manual feed (JOG, INC) is turned OFF.

(2) The jog feed or incremental feed mode is turned OFF.

[Related signals]

(1) In jog mode (JO:XC00)

(2) In incremental mode (SO:XC02)

(3) 3D manual feed (JOG,INC) in tool axis coordinate system

(4) 3D manual feed (JOG,INC) in table coordinate system

(5) 3D manual feed (JOG,INC) in feature coordinate system

(6) In tool center point rotation (TCPRS:XD27)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	Tool axis coordinate system in 3D manual feed (1st handle)	MH1ST	XD1B	XE5B	XF9B	X10DB	X121B	X135B	X149B	X15DB
A	Table coordinate system in 3D manual feed (1st handle)	MH1SB	XD1C	XE5C	XF9C	X10DC	X121C	X135C	X149C	X15DC
A	Feature coordinate system in 3D manual feed (1st handle)	MH1SF	XD1D	XE5D	XF9D	X10DD	X121D	X135D	X149D	X15DD

[Function]

This signal indicates the coordinate system in which the 3D manual feed is carried out on the 1st handle axis.
When this signal is ON, the feed on the 1st handle axis is carried out in the coordinate system of the signal.

[Operation]

This signal turns ON when:

(1) The 1st handle feed is valid, the axis selection signal is ON and the hypothetical coordinate system for 3D manual feed (1st handle) is selected.

This signal turns OFF when:

(1) The selection of the hypothetical coordinate system for 3D manual feed (1st handle) is turned OFF.

(2) The 1st handle valid signal is turned OFF.

(3) The axis selection signal is turned OFF.

[Related signals]

(1) 1st handle axis selection code (HS11 to HS116:YC40 to 4)

(2) 1st handle valid (HS1S:YC47)

(3) 3D manual feed (1st handle) in tool axis coordinate system

(4) 3D manual feed (1st handle) in table coordinate system

(5) 3D manual feed (1st handle) in feature coordinate system

(6) In tool center point rotation (TCPRS:XD27)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$5	$7	$8
A	Tool axis coordinate system in 3D manual feed (2nd handle)	MH2ST	XD1E	XE5E	XF9E	X10DE	X121E	X135E	X149E	X15DE
A	Table coordinate system in 3D manual feed(2nd handle)	MH2SB	XD1F	XE5F	XF9F	X10DF	X121F	X135F	X149F	X15DF
A	Feature coordinate system in 3D manual feed (2nd handle)	MH2SF	XD20	XE60	XFA0	X10E0	X1220	X1360	X14A0	X15E0

[Function]

This signal indicates the coordinate system in which the 3D manual feed is carried out on the 2nd handle axis.
When this signal is ON, the feed on the 2nd handle axis is carried out in the coordinate system of the signal.

[Operation]

This signal turns ON when:
(1) The 2nd handle feed is valid, the axis selection signal is ON and the hypothetical coordinate system for 3D manual feed (2nd handle) is selected.
This signal turns OFF when:
(1) The selection of the hypothetical coordinate system for 3D manual feed (2nd handle) is turned OFF.
(2) The 2nd handle valid signal is turned OFF.
(3) The axis selection signal is turned OFF.

[Related signals]

(1) 2nd handle axis selection code (HS21 to HS216:YC48 to C)
(2) 2nd handle valid (HS2S:YC4F)
(3) 3D manual feed (2nd handle) in tool axis coordinate system
(4) 3D manual feed (2nd handle) in table coordinate system
(5) 3D manual feed (2nd handle) in feature coordinate system
(6) In tool center point rotation (TCPRS:XD27)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$5	$7	$8
A	Tool axis coordinate system in 3D manual feed (3rd handle)	MH3ST	XD21	XE61	XFA1	X10E1	X1221	X1361	X14A1	X15E1
A	Table coordinate system in 3D manual feed (3rd handle)	MH3SB	XD22	XE62	XFA2	X10E2	X1222	X1362	X14A2	X15E2
A	Feature coordinate system in 3D manual feed (3rd handle)	MH3SF	XD23	XE63	XFA3	X10E3	X1223	X1363	X14A3	X15E3

[Function]

This signal indicates the coordinate system in which the 3D manual feed is carried out on the 3rd handle axis.
When this signal is ON, the manual feed on the 3rd handle axis is carried out in the coordinate system of the signal.

[Operation]

This signal turns ON when:
(1) The 3rd handle feed is valid, the axis selection signal is ON and the hypothetical coordinate system for 3D manual feed (3rd handle) is selected.
This signal turns OFF when:
(1) The selection of the hypothetical coordinate system for 3D manual feed (3rd handle) is turned OFF.
(2) The 3rd handle valid signal is turned OFF.
(3) The axis selection signal is turned OFF.

[Related signals]

(1) 3rd handle axis selection code (HS31 to HS316:YC50 to 4)
(2) 3rd handle valid (HS3S:YC57)
(3) 3D manual feed (3rd handle) in tool axis coordinate system
(4) 3D manual feed (3rd handle) in table coordinate system
(5) 3D manual feed (3rd handle) in feature coordinate system
(6) In tool center point rotation (TCPRS:XD27)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	In tool center point rotation	TCPRS	XD27	XE67	XFA7	X10E7	X1227	X1367	X14A7	X15E7

[Function]

This signal informs the operation of the rotation axis of 3D manual feed (JOG/incremental/handle).

[Operation]

This signal informs that it operates with keeping the positional relationship of tool center point looking from the workpiece, when the rotation axis of 3D manual feed (JOG/incremental/handle) is operated.

[Related signals]

(1) Tool axis coordinate system in 3D manual feed (JOG,INC)
(2) Table coordinate system in 3D manual feed (JOG,INC)
(3) Feature coordinate system in 3D manual feed (JOG,INC)
(4) Tool axis coordinate system in 3D manual feed (1st handle)
(5) Table coordinate system in 3D manual feed (1st handle)
(6) Feature coordinate system in 3D manual feed (1st handle)
(7) Tool axis coordinate system in 3D manual feed (2nd handle)
(8) Table coordinate system in 3D manual feed (2nd handle)
(9) Feature coordinate system in 3D manual feed (2nd handle)
(10) Tool axis coordinate system in 3D manual feed (3rd handle)
(11) Table coordinate system in 3D manual feed (3rd handle)
(12) Feature coordinate system in 3D manual feed (3rd handle)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	R-NAVI: MACHINING SURFACE BE-ING SELECTED	RSSCT	XD28	XE68	XFA8	X10E8	X1228	X1368	X14A8	X15E8

[Function]

This signal notifies that a machining surface is being selected by the R-Navi function.

[Operation]

This signal turns ON when:

(1) A machining surface is selected on [Surface select] of the Monitor screen.

This signal turns OFF when:

(1) The machining surface is cancelled.
(2) Emergency stop is input.

(Note) This signal will not turn ON while a machining surface is being called by a program.

[Related signals]

(1) R-Navi: machining surface being indexed (RSIND:XD29)
(2) R-Navi: machining surface indexing completion (RSIDF:XD2A)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	R-NAVI: MACHINING SURFACE BE-ING INDEXED	RSIND	XD29	XE69	XFA9	X10E9	X1229	X1369	X14A9	X15E9

[Function]

This signal notifies that a selected machining surface is being indexed by the R-Navi function.

[Operation]

This signal turns ON when:

"#11037 R-Navi Index Type" is "0"

(1) The [Index exec] menu is pressed on [Surface Selection] of the Monitor screen while a machining surface is being selected.

"#11037 R-Navi Index Type" is "1"

(1) The [Index exec] menu is pressed on [Surface Selection] of the Monitor screen and then a tool length offset No. is entered while a machining surface is being selected.

This signal turns OFF when:

(1) Indexing is completed.

(2) NC reset is input.

(3) Emergency stop is input.

[Related signals]

(1) R-Navi: machining surface being selected (RSSCT:XD28)

(2) R-Navi: machining surface indexing completion (RSIDF:XD2A)

Con-tact	Signal name	Signal abbrevia-tion	$1	$2	$3	$4	$5	$5	$7	$8
A	R-NAVI: MACHINING SURFACE IN-DEXING COMPLETION	RSIDF	XD2A	XE6A	XFAA	X10EA	X122A	X136A	X14AA	X15EA

[Function]

This signal notifies that indexing of a selected machining surface is completed by the R-Navi function.

[Operation]

This signal turns ON when:

(1) Machining surface indexing is completed, and Smoothing zero is turned ON.

This signal turns OFF when:

(1) The machining surface is cancelled.

(2) Another machining surface is selected while the surface is being selected (surfaces are switched).

(3) Emergency stop is input.

[Related signals]

(1) R-NNavi: machining surface being selected (RSSCT:XD28)

(2) R-Navi: machining surface being indexed (RSIND:XD29)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	EDIT/SEARCH WINDOW DISPLAYED		X1878

[Function]

This signal indicates that the "Edit/Search" window is displayed.

[Operation]

This signal is ON while the "Edit/Search" window is displayed.

[Related signals]

(1) Edit/Search (Y1878)

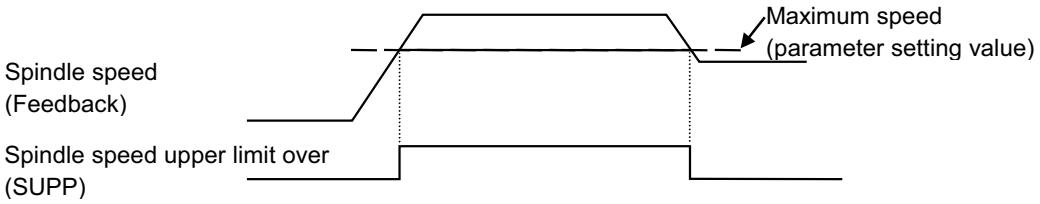
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SPEED UPPER LIMIT OVER	SUPP	X1880	X18E0	X1940	X19A0	X1A00	X1A60	X1AC0	X1B20

[Function]

This signal notifies that the feedback of the spindle motor has exceeded the maximum speed.

[Operation]

This signal turns ON when the spindle motor's feedback exceeds the maximum speed regardless of the commanded speed.



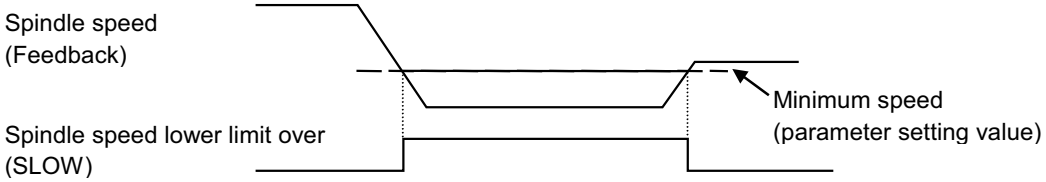
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SPEED LOWER LIMIT OVER	SLOW	X1881	X18E1	X1941	X19A1	X1A01	X1A61	X1AC1	X1B21

[Function]

This signal notifies that the feedback of the spindle motor is less than the minimum speed.

[Operation]

This signal turns ON when the spindle motor's feedback is less than the minimum speed regardless of the commanded speed.



Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	S COMMAND GEAR NO. ILLEGAL	SIGE	X1882	X18E2	X1942	X19A2	X1A02	X1A62	X1AC2	X1B22

[Function]

This signal is output if specified gear No. is illegal.

[Operation]

The signal turns ON if gear No. specified by user is beyond the maximum system gear No.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	S COMMAND MAX./MIN. COMMAND VALUE OVER	SOVE	X1883	X18E3	X1943	X19A3	X1A03	X1A63	X1AC3	X1B23

[Function]

This signal is output when S command value is clamped to the maximum or minimum value.

[Operation]

The signal turns ON if S command value is larger than spindle maximum speed parameter (Smaxn) value, or smaller than spindle minimum speed parameter (Smin) value.

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	S COMMAND NO GEAR SELECTED	SNGE	X1884	X18E4	X1944	X19A4	X1A04	X1A64	X1AC4	X1B24

[Function]

This signal is output if gear is not present for S function (S code) issued by automatic operation.

[Operation]

This signal will turn ON when the S function (S code) is issued during automatic operation, and the S code does not match any gear set in the spindle maximum speed parameters.

This signal (SNGE) is output simultaneously with spindle function strobe signal (SF).

[Related signals]

(1) Spindle function strobe (SFn:XC64)

(2) Spindle gear shift (GR1, GR2:X1885, 6)

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE GEAR SHIFT 1,2	GR1,2	X1885,6	X18E5,6	X1945,6	X19A5,6	X1A05,6	X1A65,6	X1AC5,6	X1B25,6

[Function]

This signal informs which gear stage in the spindle applies to the S command (S code) issued in the automatic operation (memory, MDI or tape) machining program.

For machines that have gear stage shift, the gear will be shifted on the machine side when this signal is received.

[Operation]

When the S command (S code) is issued in automatic operation, the gear stage for the commanded S code is output with a 2-bit (GR1, GR2) code from the preset parameters (spindle max. speed).

The relation of the spindle max. speed parameter (Smax1 to Smax4) and the "Spindle gear shift" (GR1, GR2) signal output is shown below.

Gear stage	Max. spindle speed	Spindle gear shift		
		GR2	GR1	
1	Smax1	0	0	← Range "S0 to S (Smax1)"
2	Smax2	0	1	← Range "S (Smax1)+1 to S (Smax2)"
3	Smax3	1	0	← Range "S (Smax2)+1 to S (Smax3)"
4	Smax4	1	1	← When range over "S (Smax3)+1" is specified.

This signal (GR1, GR2) is output simultaneously with the "Spindle function strobe" (SFn).

(Note 1) If the commanded S code does not match any of the gear stages, the "S command no gear selected" (SNGE) signal will be output separately from this signal.

In this case the outputs of these signals vary depending on the settings of Smax1 to Smax4.

- When a spindle speed exceeding Smax4 is commanded while Smax1 up to Smax4 are set: GR2=1, GR1=1
- When a spindle speed exceeding Smax3 is commanded while Smax1 up to Smax3 are set: GR2=1, GR1=0
- When a spindle speed exceeding Smax2 is commanded while Smax1 and Smax2 are set: GR2=0, GR1=1
- When a spindle speed exceeding Smax1 is commanded while only Smax1 is set: GR2=0, GR1=0

[Related signals]

(1) Spindle function strobe (SFn:XC64)

(2) S command no gear selected (SNGE:X1884)

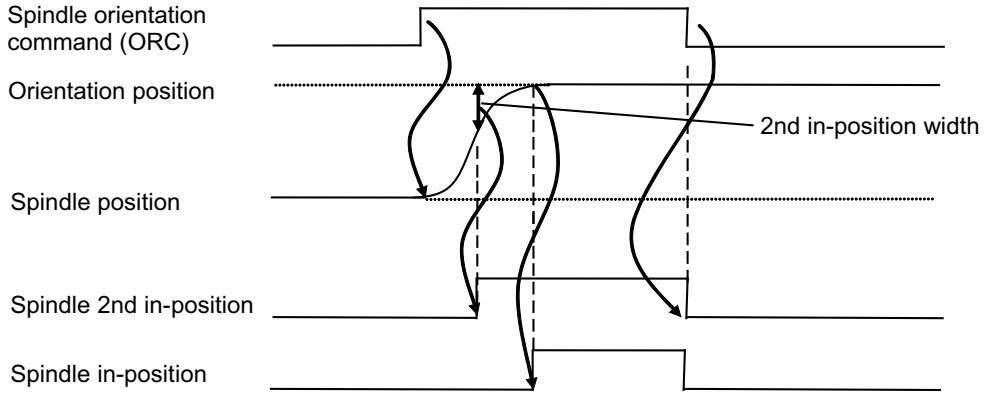
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE 2ND IN-POSITION	ORA2O	X1888	X18E8	X1948	X19A8	X1A08	X1A68	X1AC8	X1B28

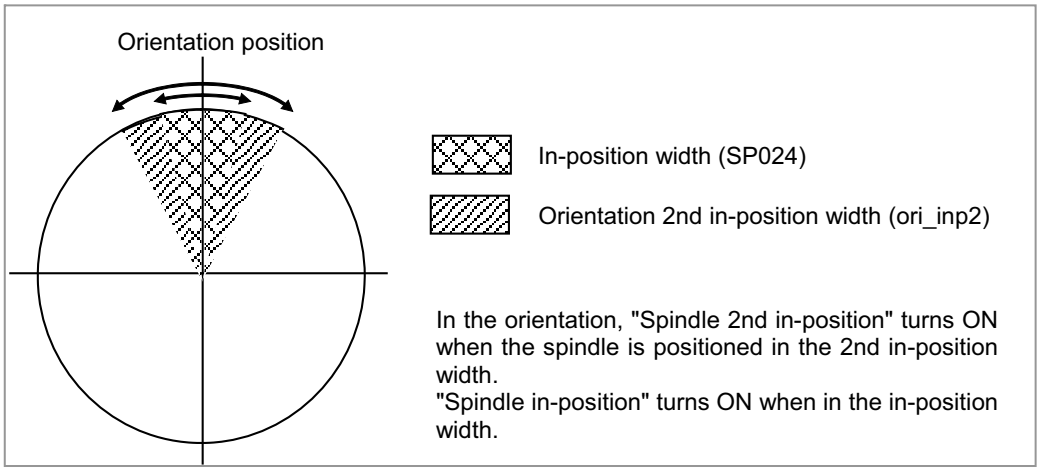
[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that the spindle is positioned in the set range in accordance with spindle orientation command.
The information is sent faster than by the "Spindle in-position" signal. This signal allows predicting the orientation completion and preventing the sequence delay time caused by the tool exchange and so on, which helps the takt time reduction.

[Operation]

This signal turns ON when the spindle positioning in the set range completes, and the difference between the orientation position and the feedback position reaches the 2nd in-position range.
(1) The in-position range is set with the spindle parameter "#3132 ori_inp2".
(2) The signal is turned OFF when the "Spindle orientation command" (ORC) is turned OFF.




Orientation position
In-position width (SP024)
Orientation 2nd in-position width (ori_inp2)
In the orientation, "Spindle 2nd in-position" turns ON when the spindle is positioned in the 2nd in-position width.
"Spindle in-position" turns ON when in the in-position width.

(Note 1) When spindle orientation command is given, orientation starts regardless of the "Spindle forward run start (SRN)" or "Spindle reverse run start (SRI)".
(Note 2) This signal is not available when an analog connection is used.
(Note 3) While the spindle is in position, it is under servo lock condition. However, if the spindle is rotated by external force, the signal may be turned OFF.

[Related signals]

(1) Spindle in-position (ORAO:X188E)
(2) Spindle orientation command (ORC:Y189E)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	CURRENT DETECTION	CDO	X1889	X18E9	X1949	X19A9	X1A09	X1A69	X1AC9	X1B29

[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that drive motor current is about to reach the permissible maximum current. The signal can be used to prevent stabbing of cutter into workpiece, for example.

[Operation]

The signal (CDO) turns ON if motor current goes up to a level (110% output) close to the permissib le maximum current (120%).

(Note 1) This signal is valid only for the system that is high-speed serial connection with the controller.

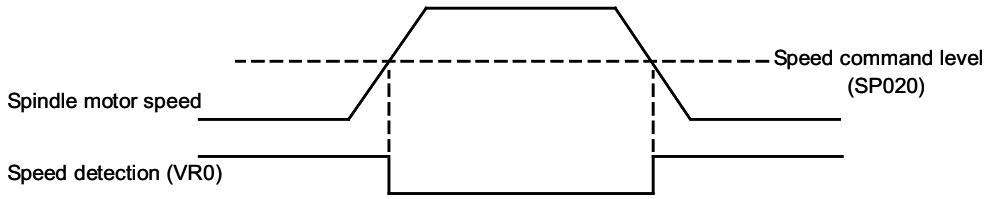
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPEED DETECTION	VRO	X188A	X18EA	X194A	X19AA	X1A0A	X1A6A	X1ACA	X1B2A

[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that motor speed is dropped below the speed specified by parameter.

[Operation]

The signal (VRO) turns ON when motor speed (motor rotation speed) drops below the speed specified by the spindle parameter "#13028 SP028 (Speed detection set value)".



(Note 1) This signal is valid only for the system that is high-speed serial connection with the controller.

[Related signals]

(1) Speed detection 2 (SD2:X189D)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN SPINDLE ALARM	FLO	X188B	X18EB	X194B	X19AB	X1A0B	X1A6B	X1ACB	X1B2B

[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that failure occurs in spindle controller.

[Operation]

The signal turns ON if alarm which occurs in the spindle controller is detected.

To cancel alarm, reset the controller (by reset & rewind), turn the controller power OFF or turn the spindle controller power supply OFF. Note that reset method depends on type of alarm.

Typical examples of alarm are listed below. For details of alarm contents and cancel procedure, refer to the Instruction Manual for the spindle drive unit.

(1) Overcurrent
(2) Breaker trip
(3) Motor overheat

(Note 1) This signal is valid only for the system that is high-speed serial connected with the controller.

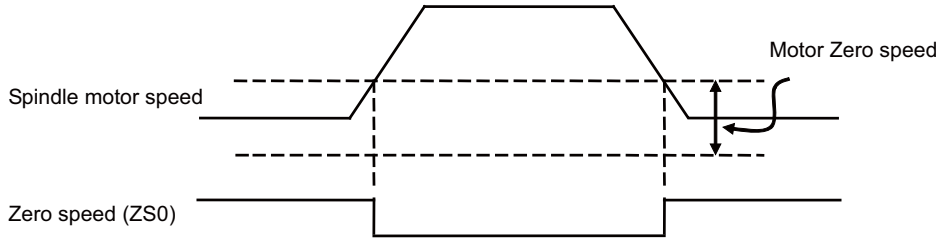
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	ZERO SPEED	ZSO	X188C	X18EC	X194C	X19AC	X1A0C	X1A6C	X1ACC	X1B2C

[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that motor speed has dropped below the set speed level.

[Operation]

This signal turns ON when the actual spindle motor speed drops below the speed specified by the spindle parameter "#13027 SP027 (motor zero speed)".



(Note 1) The signal is output, no matter whether direction of rotation is "Spindle forward run start" (SRN) or "Spindle reverse run start" (SRI).

(Note 2) Minimum output pulse width of the signal is about 200ms.

(Note 3) Speed at which the signal is output can be set within range from 1r/min to 1000r/min with the spindle parameters.

(Note 4) This signal is valid only for the system that is high-speed serial connected with the controller.

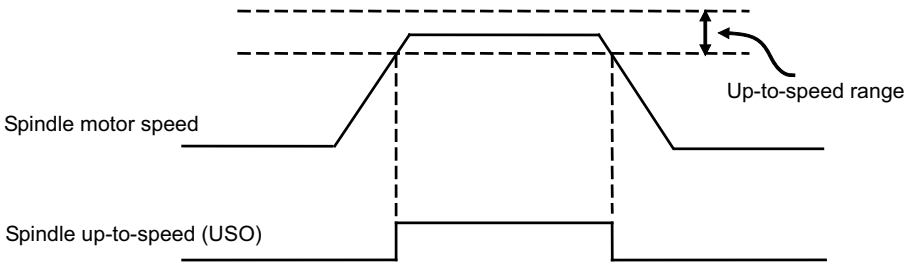
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE UP-TO-SPEED	USO	X188D	X18ED	X194D	X19AD	X1A0D	X1A6D	X1ACD	X1B2D

[Function]

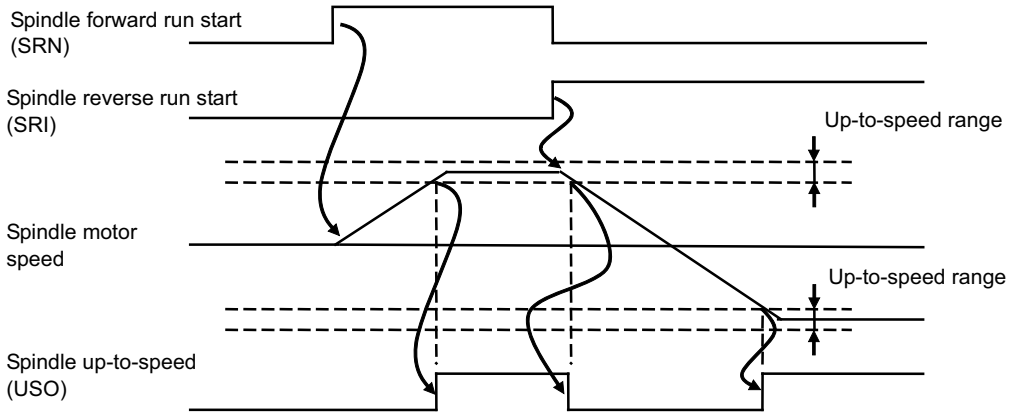
This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that actual spindle motor speed reaches the range set with the parameter "#3105 sut"(standard setting ±15%).

This signal is used for the S command completion conditions or control axis interlock during automatic operation.

[Operation]



When a command is given to change motor rotation from "forward" to "reverse", spindle motor speed starts going down and the signal (USO) is turned OFF. When motor speed enters the specified detection range, the signal turns ON.



(Note 1) The signal cannot be output if neither "Spindle forward run start" (SRN) signal nor "Spindle reverse run start" (SRI) signal is ON.

(Note 2) This signal is not output when operating with a command that is not a speed command such as synchronous tap.

(Note 3) This signal is valid only for the system that is high-speed serial connected with the controller.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE IN-POSITION	ORAO	X188E	X18EE	X194E	X19AE	X1A0E	X1A6E	X1ACE	X1B2E

[Function]

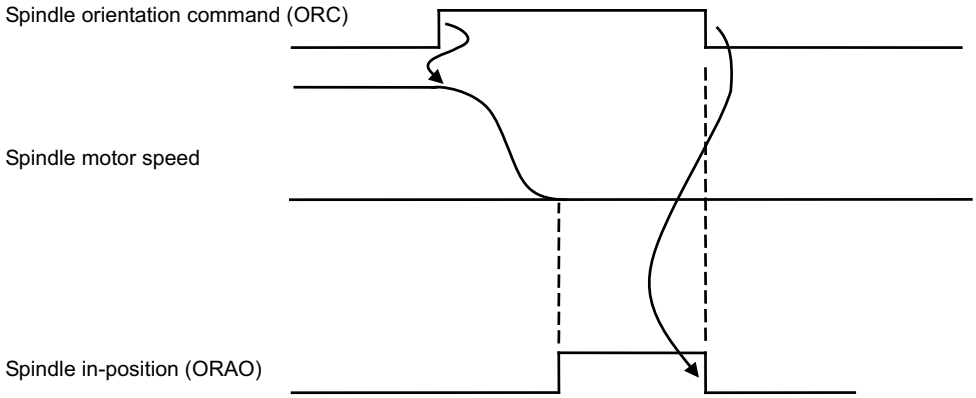
This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that the spindle is positioned in the set range in accordance with spindle orientation command.

[Operation]

When the spindle positioning in the set range completes, this signal will turn ON. The spindle orientation is started by "Spindle orientation command" signal (ORC).

(1) The in-position range is set with the spindle parameter "#13024 SP024 (INP) ".

(2) The signal is turned OFF when the "Spindle orientation command" (ORC) is turned OFF.



(Note 1) When spindle orientation command is given, orientation starts regardless of the "Spindle forward run start (SRN)" or "Spindle reverse run start (SRI)".

(Note 2) This signal is not available when an analog connection is used.

(Note 3) While the spindle is in position, it is under servo lock condition. However, if the spindle is rotated by external force, the signal (ORAO) may be turned OFF.

[Related signals]

(1) Spindle 2nd in-position (ORA20:X1888)

(2) Spindle orientation command (ORC:Y189E)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN L COIL SELECTION	LCSA	X188F	X18EF	X194F	X19AF	X1A0F	X1A6F	X1ACF	X1B2F

[Function]

This signal indicates that the low-speed coil is being selected in the spindle coil changeover function.

[Operation]

The high-speed coil and low-speed coil are changed over only with the "L coil selection" (LRSL) in the 2-step coil changeover specification. The high-speed coil, middle-speed coil and low-speed coil are changed over with the combination of the "L coil selection" (LRSL) and "M coil selection" (LRSM) in the 3-step coil changeover specification.

(1) 2-step coil changeover

Selected coil	L coil selection(LRSL)	In L coil selection(LCSA)
High-speed (H)	OFF	OFF
Low-speed (L)	ON	ON

(2) 3-step coil changeover

Selected coil	L coil selection (LRSL)	M coil selection (LRSM)	In L coil selection (LCSA)	In M coil selection (MCSA)
High-speed (H)	OFF	OFF	OFF	OFF
Middle-speed(M)	OFF	ON	OFF	ON
Low-speed(L)	ON	OFF	ON	OFF
	ON	ON	ON	ON

[Related signals]

(1) L coil selection (LRSL:Y189F)

(2) M coil selection (LRSM:Y18A6)

(3) In M coil selection (MCSA:X189E)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE READY-ON	SMA	X1890	X18F0	X1950	X19B0	X1A10	X1A70	X1AD0	X1B30

[Function]

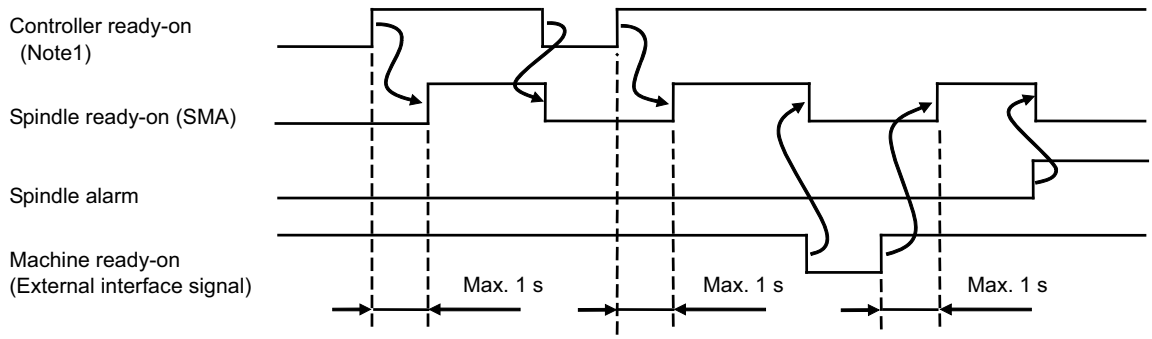
This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that the spindle can operate.

[Operation]

This signal (SMA) turns ON when the spindle controller is ready for operation. The signal turns OFF (ready off) in the following conditions.

(1) A spindle alarm is generated.

(2) "Ready-on" signal (internal signal) from controller is OFF.



(Note 1) The ready on signal is output from the controller to the spindle controller.

(Note 2) This signal is valid only for the system that is high-speed serial connected with the controller.

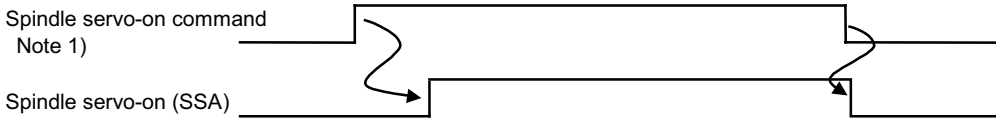
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SERVO-ON	SSA	X1891	X18F1	X1951	X19B1	X1A11	X1A71	X1AD1	X1B31

[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that the spindle is under the position control state (synchronous tap control, C-axis control).

[Operation]

The "Spindle servo-on" signal (SSA) turns ON when the spindle is ready (SMA signal is ON), the servo-on command has been transferred from the controller to the spindle controller, and the spindle controller is in the servo-on state.
Note that this signal turns OFF during rotation with "spindle forward run start"(SRN)/"spindle reverse run start"(SRI) (except during spindle synchronization) or spindle orientation.
This signal (SSA) turns OFF when the servo-on command is canceled.



(Note 1) The spindle servo-on command is output from the controller to the spindle controller, and is mainly output during synchronous tap control.
(Note 2) While the "Spindle servo-on" signal is ON, all input signals for "Spindle forward run start" (SRN), "Spindle reverse run start" (SRI), and "Spindle orientation command" (ORC) are ignored.
(Note 3) This signal is valid only for the system that is high-speed serial connected with the controller.

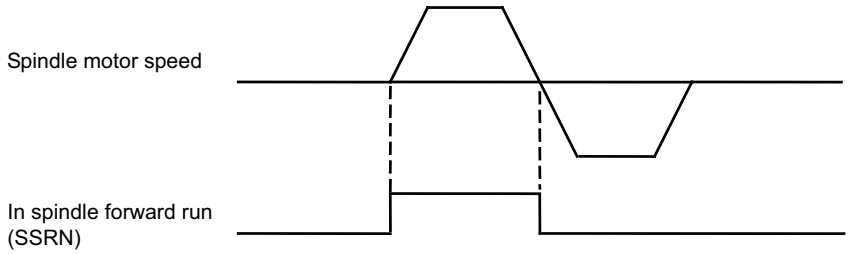
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN SPINDLE FORWARD RUN	SSRN	X1893	X18F3	X1953	X19B3	X1A13	X1A73	X1AD3	X1B33

[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that the spindle is rotating in the forward direction.

[Operation]

The "In spindle forward run" signal (SSRN) turns ON when the spindle motor is rotating in the forward direction. This will also turn ON if the spindle motor is rotating in the forward direction during orientation or synchronous tap.



(Note 1) The "In spindle forward run" signal (SSRN) turns ON and OFF while the spindle motor is in the stop state with servo rigidity during oriented motion or synchronous tap.
(Note 2) This signal is valid only for the system that is high-speed serial connected with the controller.

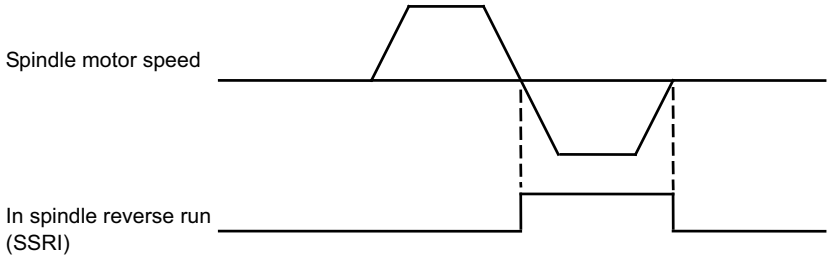
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN SPINDLE REVERSE RUN	SSRI	X1894	X18F4	X1954	X19B4	X1A14	X1A74	X1AD4	X1B34

[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that the spindle motor is rotating in the reverse direction.

[Operation]

The "In spindle reverse run" (SSRI) signal turns ON when the spindle motor rotates in the reverse direction. It also turns ON even during oriented motion or synchronous tap if the spindle motor rotates in the reverse.



(Note 1) The "In spindle reverse run" (SSRI) signal turns ON and OFF while the spindle motor is in the stop state with servo rigidity during oriented motion or synchronous tap.

(Note 2) This signal is valid only for the system that is high-speed serial connected with the controller.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	POSITION LOOP IN-POSITION	SIMP	X1896	X18F6	X1956	X19B6	X1A16	X1A76	X1AD6	X1B36

[Function]

If the spindle controller is connected with high-speed serial connection, this signal will inform that the spindle is in the in-position state during synchronous tap.

[Operation]

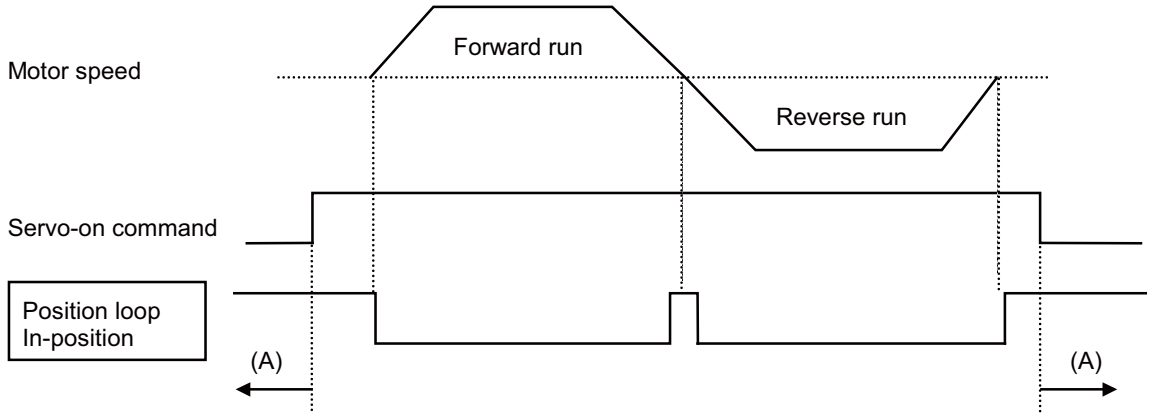
The signal will turn ON when:

(1) The droop amount (servo tracking delay error) is within the in-position range during synchronous tap control (servo on).

(2) Synchronous tap control is not commanded. ((A)in following drawing)

The signal will turn OFF when:

(1) The droop amount (servo tracking delay error) has exceeded the in-position range during synchronous tap control (servo on).



Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN SPINDLE TORQUE LIMIT	STLQ	X1897	X18F7	X1957	X19B7	X1A17	X1A77	X1AD7	X1B37

[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that the spindle is in position under C-axis control or synchronous tap control.

[Operation]

The "STLQ" signal turns ON when:

(1) "Spindle torque limit 1" (TL1) or "Spindle torque limit 2" (TL2) signal is ON.

The "STLQ" signal turns OFF when:

(1) "Spindle torque limit 1" (TL1) or "Spindle torque limit 2" (TL2) signal is OFF.

(Note 1) This signal is valid only for the system that is high-speed serial connected with the controller.

[Related signals]

(1) Spindle torque limit 1 (TL1:Y189A)

(2) Spindle torque limit 2 (TL2:Y189B)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Spindle torque limit reached		X189A	X18FA	X195A	X19BA	X1A1A	X1A7A	X1ADA	X1B3A

[Function]

This signal informs that the actual torque has reached the limit on the torque limit target spindle.

[Operation]

The signal turns ON when:

(1) The actual torque has reached the limit on the torque limit target spindle.

The signal turns OFF when:

(1) The actual torque of the torque limit target spindle is under its limit.

[Related signals]

(1) In spindle torque limit (STLQ:X1897)

(2) Spindle torque limit 1 (TL1:Y189A)

(3) Spindle torque limit 2 (TL2:Y189B)

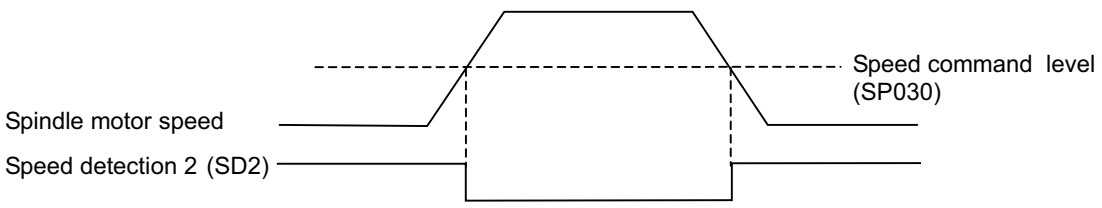
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPEED DETECTION 2	SD2	X189D	X18FD	X195D	X19BD	X1A1D	X1A7D	X1ADD	X1B3D

[Function]

This signal is output from the high-speed serial connection specification spindle controller (spindle drive) and informs that motor speed is dropped below the speed specified by the parameter.

[Operation]

This signal (SD2) turns ON if the motor speed (motor rotation speed) drops the detection level specified by the parameter "#13030 SP030".



(Note) This signal is valid only with the system that is high-speed serial connection with the spindle controller.

[Related signals]

(1) Speed detection (VRO:X188A)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN M COIL SELECTION	MCSA	X189E	X18FE	X195E	X19BE	X1A1E	X1A7E	X1ADE	X1B3E

[Function]

This signal indicates that the middle-speed coil is being selected in the 3-step coil changeover specification of the spindle coil changeover function.

[Operation]

The state of the selected coil is combined with the "In L coil selection" (LCSA), and that is output.

Selected coil	L coil selection (LRSL)	M coil selection (LRSM)	In L coil selection (LCSA)	In M coil selection (MCSA)
High-speed (H)	OFF	OFF	OFF	OFF
Middle-speed (M)	OFF	ON	OFF	ON
Low-speed (L)	ON	OFF	ON	OFF
	ON	ON	ON	ON

[Related signals]

(1) L coil selection (LRSL:Y189F)

(2) M coil selection (LRSM:Y18A6)

(3) In L coil selection (LCSA:X188F)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	INDEX POSITIONING COMPLETION		X189F	X18FF	X195F	X19BF	X1A1F	X1A7F	X1ADF	X1B3F

[Function]

This signal informs that positioning for the spindle forward run and reverse run indexing functions has been completed.

[Operation]

(1) Orient the spindle.

If values are set in the parameters and multi-point orientation position data at this time, the spindle will be positioned to an angle shifted by the amount obtained by adding the two values.

If there is multi-point orientation position data during orientation, the spindle will be positioned to the angle shifted by that amount during forward run/reverse run indexing.

The basic orientation shift is carried out with parameters.

(2) Next, carry out positioning to an arbitrary angle using the forward run/reverse run indexing function.

At this time, set the angle data before turning the "Spindle forward run/reverse run index" signal ON. (Note 1)

The "Index positioning completion" signal will turn OFF when forward run/reverse run is started (turned ON), but it will take some time for the signal to turn OFF once, wait at least 100ms before confirming that the index positioning is completed after forward run/reverse run is completed. (Note 2)

When the spindle is at the multi-point orientation position:

(a) Turning the "Spindle forward/reverse run index" signal ON will turn OFF the "Index positioning completion" signal.

(b) The "Index positioning completion" signal will go ON again after the index positioning complete signal OFF time which is designated with "#3126 tret_fin_off".

When the spindle is not at the multi-point orientation position:

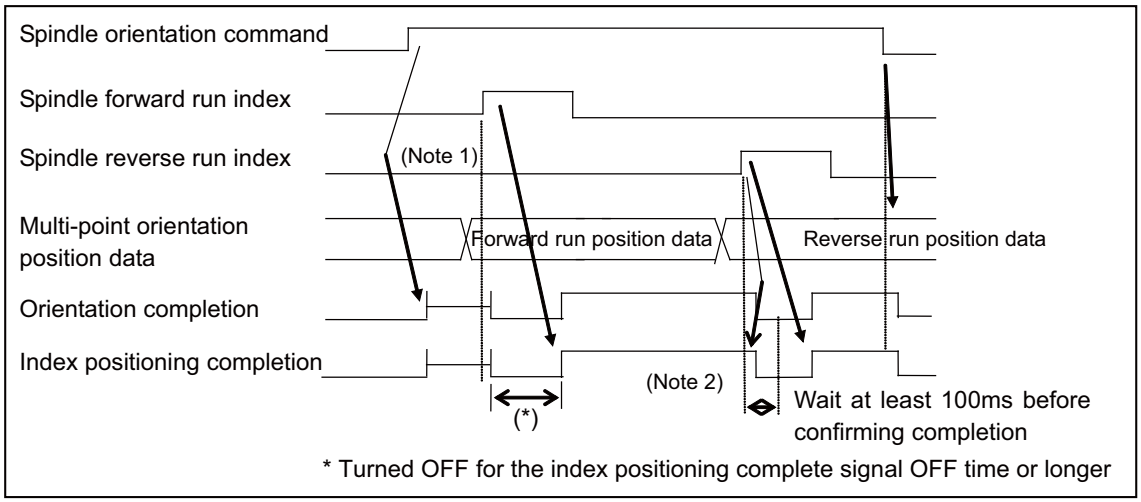
(a) Turning the "Spindle forward/reverse run index" signal ON will turn OFF the "Index positioning completion" signal.

(b) The "Index positioning completion" signal will go ON again after the spindle has moved.
The signal will not go ON before the index positioning complete signal OFF time passes, even when the spindle has moved.

Consider the set value for index positioning complete signal OFF time when using the "Index positioning completion" signal.

(3) If the spindle orientation holding torque forces are overlapped, the torque limit function will be used.

An example of the spindle indexing timing is shown below.


Spindle orientation command
Spindle forward run index
Spindle reverse run index
(Note 1)
Multi-point orientation position data
Forward run position data
Reverse run position data
Orientation completion
Index positioning completion
(Note 2)
(*)
Wait at least 100ms before confirming completion
* Turned OFF for the index positioning complete signal OFF time or longer

[Related signals]

(1) Spindle orientation command (ORC:Y189E)
(2) Spindle forward run index (WRN:Y189C)
(3) Spindle reverse run index (WRI:Y189D)
(4) Multi-point orientation position data (R7009)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE ENABLE	ENB	X18A0	X1900	X1960	X19C0	X1A20	X1A80	X1AE0	X1B40

[Function]

This signal informs whether there are command outputs to the spindle or not.
0: No command output to spindle
1: With command output to spindle

[Related signals]

(1) Spindle selection (SWS:Y18A8)
(2) Spindle command selection (SLSP:R7002)
(3) Spindle stop (SSTP:Y1894)
(4) Encoder selection (R2567)
(5) Spindle forward run start (SRN:Y1898)
(6) Spindle reverse run start (SRI:Y1899)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN SPINDLE SYNCHRONIZATION	SPSYN1	X18A8	X1908	X1968	X19C8	X1A28	X1A88	X1AE8	X1B48

[Function]

This signal informs that the spindle synchronous control mode has been entered.

[Operation]

The signal turns ON when:
(1) The G114.1 is commanded, and spindle synchronous control is entered. (Spindle synchronization control I)
(2) The spindle synchronous control signal (SPSY) turns ON. (Spindle synchronization control II)

The signal turns OFF when:
(1) Spindle synchronous control is canceled with the G113 command. Or, when the spindle synchronization cancel signal (SPSYC) turns ON. (Spindle synchronization control I)
(2) When the spindle synchronous control signal (SPSY) turns OFF. (Spindle synchronization control II)

[Related signals]

(1) Spindle rotation speed synchronization completion (FSPRV:X18A9)
(2) Spindle phase synchronization completion (FSPPH:X18AA)
(3) Spindle synchronization (SPSY:Y18B0)
(4) Spindle phase synchronization (SPPHS:Y18B1)
(5) Spindle synchronization cancel (SPSYC:Y18B8)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE ROTATION SPEED SYNCHRONIZATION COMPLETION	FSPRV	X18A9	X1909	X1969	X19C9	X1A29	X1A89	X1AE9	X1B49

[Function]

This signal informs that the spindle synchronization state mode is entered.

(Note) This signal uses the 1st spindle signal regardless of the hob spindle's number.

[Operation]

The signal turns ON when:

(1) Both the reference and synchronized spindle speeds reach the commanded synchronization speed during rotation synchronzation mode.
(Spindle synchronization I)

(2) The workpiece axis rotation speed reaches the value set for the spindle synchronization rotation speed attainment level corresponding to the workpiece axis and rotary tool axis rotation ratio command in spindle synchronization
(no R command) mode. (Polygon)

(3) The workpiece axis rotation speed completes phase alignment at the rotation speed corresponding to the rotation ratio command for the workpiece axis and rotary tool axis in spindle synchronization (with R command) mode. (Polygon)

(4) Parameter #1239 bit 3 is reset (reset1, reset2, reset & rewind) at 1.
(Polygon)

The signal turns OFF when:

(1) The actual rotation speed of the reference spindle or synchronized spindle, in respect to the spindle synchronous rotation speed command value, widely exceeds or deviates value set for the spindle synchronization rotation speed attainment level during the rotation synchronization mode.

(2) The spindle synchronous control mode is canceled.

[Related signals]

(1) In spindle synchronization (SPSYN1:X18A8)

(2) Spindle phase synchronization completion (FSPPH:X18AA)

(3) Spindle synchronization (SPSY:Y18B0)

(4) Spindle phase synchronization (SPPHS:Y18B1)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE PHASE SYNCHRONIZATION COMPLETION	FSPPH	X18AA	X190A	X196A	X19CA	X1A2A	X1A8A	X1AEA	X1B4A

[Function]

This signal informs that the spindle synchronization state is entered.

[Operation]

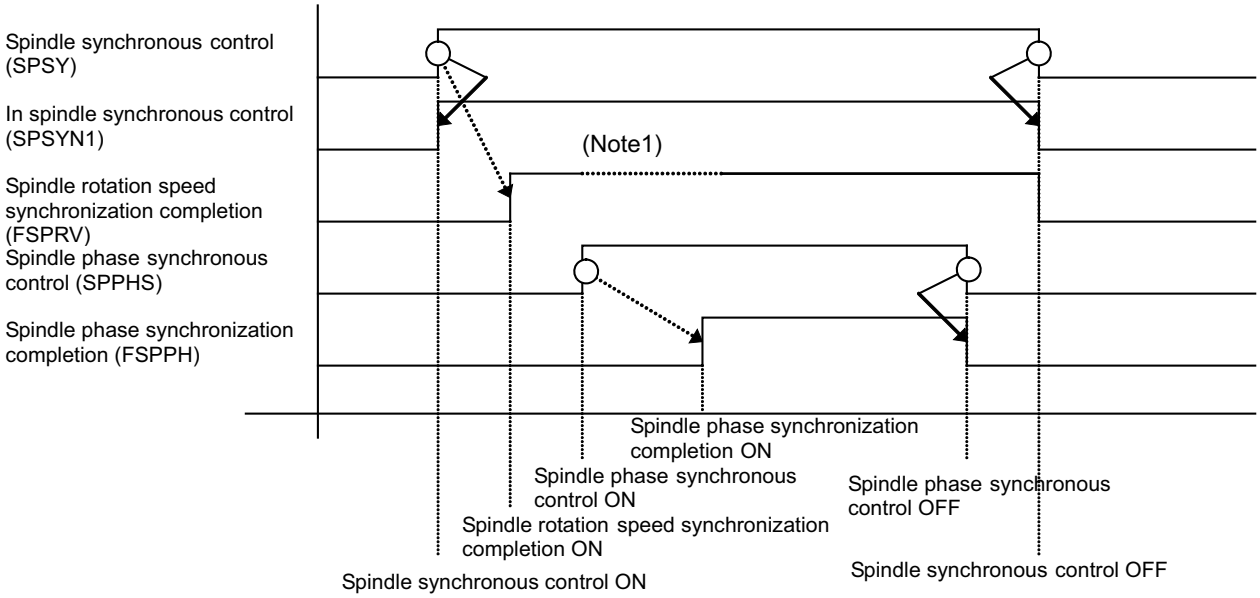
The signal turns ON when:

(1) The phase alignment of the reference spindle and synchronized spindle is completed during the phase synchronization mode.

The signal turns OFF when:

(1) The phase difference of the reference spindle and synchronized spindle exceeds the value set for the spindle synchronization phase attainment level during the phase synchronization mode.

(2) The spindle synchronous control mode is canceled.


Spindle synchronous control (SPSY)
In spindle synchronous control (SPSYN1)
Spindle rotation speed synchronization completion (FSPRV)
Spindle phase synchronous control (SPPHS)
Spindle phase synchronization completion (FSPPH)
(Note1)
Spindle phase synchronization completion ON
Spindle phase synchronous control ON
Spindle phase synchronous control OFF
Spindle rotation speed synchronization completion ON
Spindle synchronous control ON
Spindle synchronous control OFF

(Note1) Temporary turn OFF to change the rotation speed during the phase synchronization.

⚠ CAUTION	**Always turn the spindle phase synchronization completion signal ON before chucking both ends of the workpiece to the reference spindle and synchronized spindle. If the spindle phase synchronization signal is turned ON when both ends of the workpiece are chucked to the reference spindle and synchronized spindle, the chuck or workpiece could be damaged by the torsion that occurs during phase alignment.**

[Related signals]

(1) In spindle synchronization (SPSYN1:X18A8)

(2) Spindle rotation speed synchronization completion (FSPRV:X18A9)

(3) Spindle synchronization (SPSY:Y18B0)

(4) Spindle phase synchronization (SPPHS:Y18B1)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN SPINDLE SYNCHRONIZATION 2	SPSYN2	X18AB	X190B	X196B	X19CB	X1A2B	X1A8B	X1AEB	X1B4B

[Function]

This signal informs that the spindle-spindle polygon machining is started.

[Operation]

This signal turns ON when:

(1) G114.2 is commanded, and the spindle-spindle polygon machining is started.

This signal turns OFF when:

(1) G113 is commanded, and the spindle-spindle polygon machining is canceled.

(2) When the spindle synchronization cancel signal (SPSYC) is input, and spindle-spindle polygon machining is canceled.

[Related signals]

(1) Spindle synchronization cancel (SPSYC:Y18B8)

(2) Spindle rotation speed synchronization completion (FSPRV:X18A9)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	CHUCK CLOSE CONFIRMATION	SPCMP	X18AC	X190C	X196C	X19CC	X1A2C	X1A8C	X1AEC	X1B4C

[Function]

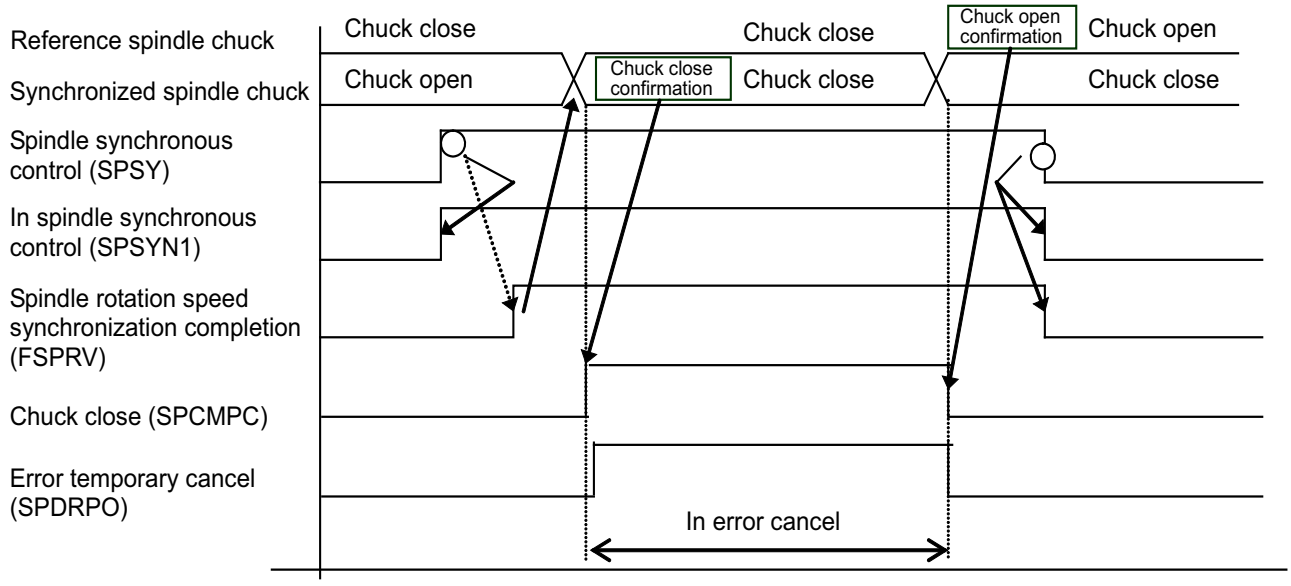
This signal informs that chuck close (SPCMPC) is input during spindle synchronous control.

[Operation]

This signal turns ON when the "Chuck close" (SPCMPC) is ON.

This signal turns OFF when the "Chuck close" (SPCMPC) is OFF.

This signal turns OFF when the spindle synchronous control is canceled.



(Note) Use "error temporary cancel" signal only when the position error between two spindles still occurs even after the "Chuck close" signal is turned ON.

[Related signals]

(1) Chuck close (SPCMPC:Y18B9)

(2) In spindle synchronization (SPSYN1:X18A8)

(3) Spindle rotation speed synchronization completion (FSPRV:X18A9)

(4) Spindle synchronization (SPSY:Y18B0)

(5) Error temporary cancel (SPDRPO:Y18B5)

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	TOOL SPINDLE SYNCHRONIZATION I (POLYGON) ON	TSS1	X18AD	X190D	X196D	X19CD	X1A2D	X1A8D	X1AED	X1B4D

[Function]

This signal informs that the tool spindle synchronization I (polygon) mode has been entered.

[Operation]

This signal turns ON when:

(1) The G114.2 is commanded, and the tool spindle synchronization I is entered.

This signal turns OFF when:

(1) The tool spindle synchronization I is canceled with the G113 command.

(2) The tool spindle synchronization I is canceled with the "Spindle synchronization/ superimposition cancel" signal (SPSYC).

(Note 1) Refer to the signal of the 1st spindle if "#1440 multi_sp_syn" = "0".

(Note 2) Refer to the signal of the synchronized spindle if "#1440 multi_sp_syn" = "1".

[Related signals]

(1) Spindle rotation speed synchronization completion (FSPRV:X18A9)

(2) Spindle synchronization/ superimposition cancel (SPSYC:Y18B8)

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN TOOL SPINDLE SYNCHRONIZATION II	SPSYN3	X18AE	X190E	X196E	X19CE	X1A2E	X1A8E	X1AEE	X1B4E

[Function]

This signal informs that the tool spindle synchronization II (hob machining) is being executed.

(Note) This signal uses the 1st spindle signal regardless of the hob spindle's number.

[Operation]

This signal turns ON when:

(1) Tool spindle synchronization II (hob machining) is started with a G114.3 command.

This signal turns OFF when:

(1) Spindle synchronous control is canceled with a G113 command or when the "Spindle synchronization cancel" (SPSYC) signal turns ON.

[Related signals]

(1) Spindle synchronization/superimposition cancel (SPSYC:Y18B8)

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SUPERIMPOSITION CONTROL: CHANGE DISABLED	SPNCH	X18AF	X190F	X196F	X19CF	X1A2F	X1A8F	X1AEF	X1B4F

[Function]

This signal indicates that the spindle rotation speed command is invalid in the following situation: the spindle rotation speed is commanded to the reference spindle while a tapping or synchronized tapping cycle is executed for the superimposed spindle in the spindle superimposition control.

[Operation]

This signal turns ON when:

(1) The spindle rotation speed is commanded to the reference spindle while a tapping or synchronized tapping cycle is executed for the superimposed spindle in the spindle superimposition control mode.

This signal turns OFF when:

(1) A tapping or synchronized tapping cycle for the superimposed spindle in the spindle superimposition control is completed, and commands to the reference spindle become valid.

(2) The spindle superimposition mode is canceled.

(Note) Refer to the signal of the superimposed spindle.

[Related signals]

(1) Spindle synchronization/ superimposition cancel (SPSYC:Y18B8)

(2) Spindle superimposition control ON (SPILE:X18B1)

(3) Spindle rotation speed synchronization completion (FSPRV:X18A9)

(4) Spindle superimposition control: Spindle superimposition clamped (SPLCR:X18B2)

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SUPERIMPOSITION CONTROL ON	SPILE	X18B1	X1911	X1971	X19D1	X1A31	X1A91	X1AF1	X1B51

[Function]

This signal indicates that the spindle superimposition control mode has been entered.

[Operation]

This signal turns ON when:

(1) The G164 is commanded, and the spindle superimposition control mode is entered.

This signal turns OFF when:

(1) The spindle superimposition control is canceled with the G113 command.

(2) The spindle superimposition control is canceled with the "Spindle synchronization/ superimposition cancel" signal (SPSYC).

[Related signals]

(1) Spindle superimposition control: Speed change disabled (SPNCH:X18AF)

(2) Spindle synchronization/ superimposition cancel (SPSYC:Y18B8)

(3) Spindle rotation speed synchronization completion (FSPRV:X18A9)

(4) Spindle superimposition control: Spindle superimposition clamped (SPLCR:X18B2)

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SUPERIMPOSITION CONTROL: SPINDLE SUPERIMPOSITION CLAMPED	SPLCR	X18B2	X1912	X1972	X19D2	X1A32	X1A92	X1AF2	X1B52

[Function]

This signal indicates that the following event occurred during the spindle superimposition control: the reference spindle was clamped at the maximum rotation speed of the superimposed spindle, or the superimposed spindle was clamped during superimposition (the sum of the command rotation speeds determined based on the rotation direction of the reference and superimposed spindles has exceeded the maximum rotation speed of the superimposed spindle).

[Operation]

This signal turns ON when:

(1) The reference spindle was clamped at the maximum rotation speed of the superimposed spindle during the spindle superimposition control.

(2) The superimposed spindle was clamped during superimposition (the sum of the command rotation speeds determined based on the rotation direction of the reference and superimposed spindles has exceeded the maximum rotation speed of the superimposed spindle).

This signal turns OFF when:

(1) The rotation speed of the reference spindle falls below the maximum rotation speed of the superimposed spindle during the spindle superimposition control.

(2) The rotation speed of the superimposed spindle falls below the maximum rotation speed of the superimposed spindle during the spindle superimposition control.

(3) The spindle superimposition control mode is canceled.

[Related signals]

(1) Spindle superimposition control: Speed change disabled (SPNCH:X18AF)

(2) Spindle synchronization/ superimposition cancel (SPSYC:Y18B8)

(3) Spindle superimposition control ON (SPILE:X1881)

(4) Spindle rotation speed synchronization completion (FSPRV:X18A9)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	HOB AXIS DELAY EXCESS	PHOVR	X18B3	X1913	X1973	X19D3	X1A33	X1A93	X1AF3	X1B53

[Function]

This signal informs that, after the spindle rotation speed synchronization completion in the tool spindle synchronization II (Hobbing), the hob axis tracking delay between the actual position and the commanded position exceeds the delay allowable angle.

(Note) This signal uses the 1st spindle signal regardless of the hob spindle's number.

[Operation]

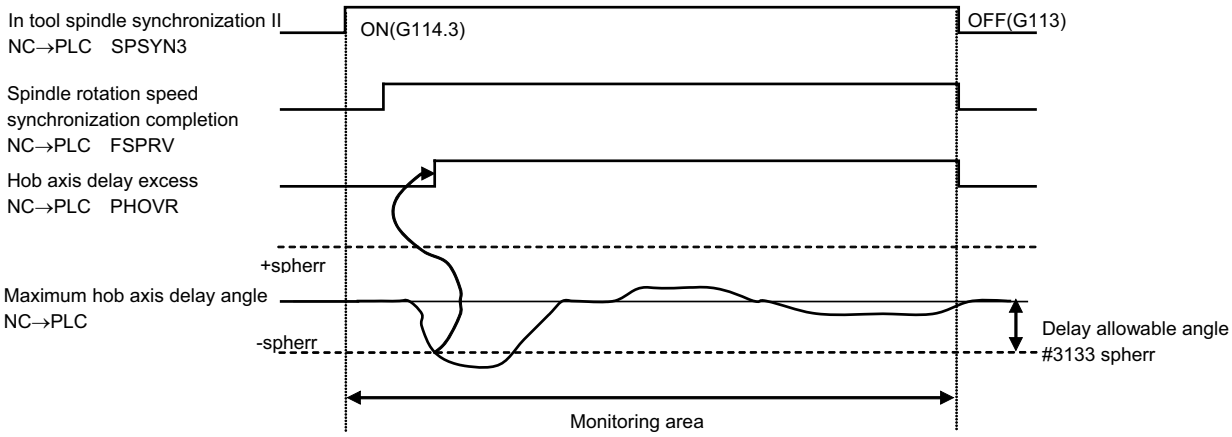
This signal turns ON when:

(1) The spindle rotation speed synchronization has been completed and the maximum delay angle of the hob axis (spindle) exceeds the delay allowable angle designated with "#3133 spherr".

This signal turns OFF when:

(1) The tool spindle synchronization II is canceled.

[Timing chart]



[Related signals]

(1) In tool spindle synchronization II (SPSYN3:X18AE)

(2) Spindle phase synchronization completion (FSPRV:X18A9)

(3) Spindle synchronization Maximum phase error/Maximum hob axis delay angle (R6517)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN SPINDLE HOLDING FORCE UP	EXOFN	X18B5	X1915	X1975	X19D5	X1A35	X1A95	X1AF5	X1B55

[Function]

The spindle holding force up (disturbance observer) state is output to this signal.

[Operation]

This signal turns ON when the "Spindle holding force up" (EXOBS) signal turns ON and the spindle drive unit validates the disturbance observer.

Turning OFF the "Spindle holding force up" (EXOBS) signal turns this signal OFF.

[Related signals]

(1) Spindle holding force up (EXOBS:Y1893)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	IN SPINDLE OFF	SPOFFA	X18B6	X1916	X1976	X19D6	X1A36	X1A96	X1AF6	X1B56

[Function]

The signal communicates that the spindle is being excluded from CNC control.

[Operation]

This signal turns ON when the spindle is being excluded from CNC control due to the signal "EXCLUDE SPINDLE (SPOFF)".

Any commands towards the spindle for which this signal is ON are invalid.

[Related signals]

(1) SPINDLE OFF REQUEST (SPOFF:Y18BF)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE POSITION CONTROL (SPINDLE/C AXIS CONTROL): C AXIS MODE ON	SVMD	X18C1	X1921	X1981	X19E1	X1A41	X1AA1	X1B01	X1B61

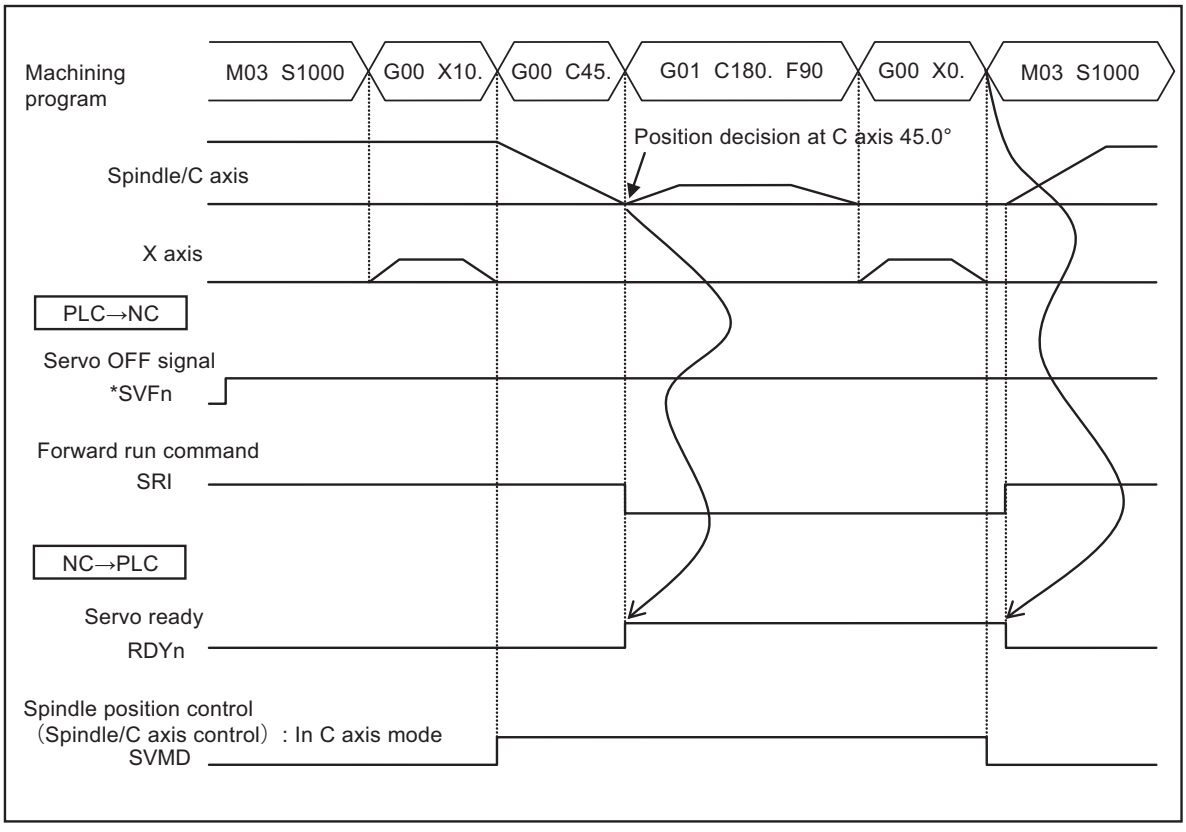
[Function]

This signal indicates that the mode is the C axis mode or spindle mode when the program command method ("#3129 cax_spec/bit0" = "1") is selected for the spindle in the spindle position control.

[Operation]

This signal turns ON when changing to the C axis mode is commanded, and it remains ON until changing to the spindle mode is commanded. This signal indicates that a mode change command was executed.

(Note) The "Spindle position control (Spindle/C axis control): C axis mode ON" signal (SVMD) does not turn ON when the mode was changed with the Servo OFF signal (*SVFn) or the "Spindle position control (Spindle/C axis control): C axis selection" signal (CMOD).



Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE GEAR SELECTION OUT-PUT 1,2	GO1,2	X18C2,3	X1922,3	X1982,3	X19E2,3	X1A42,3	X1AA2,3	X1B02,3	X1B62,3

[Function]

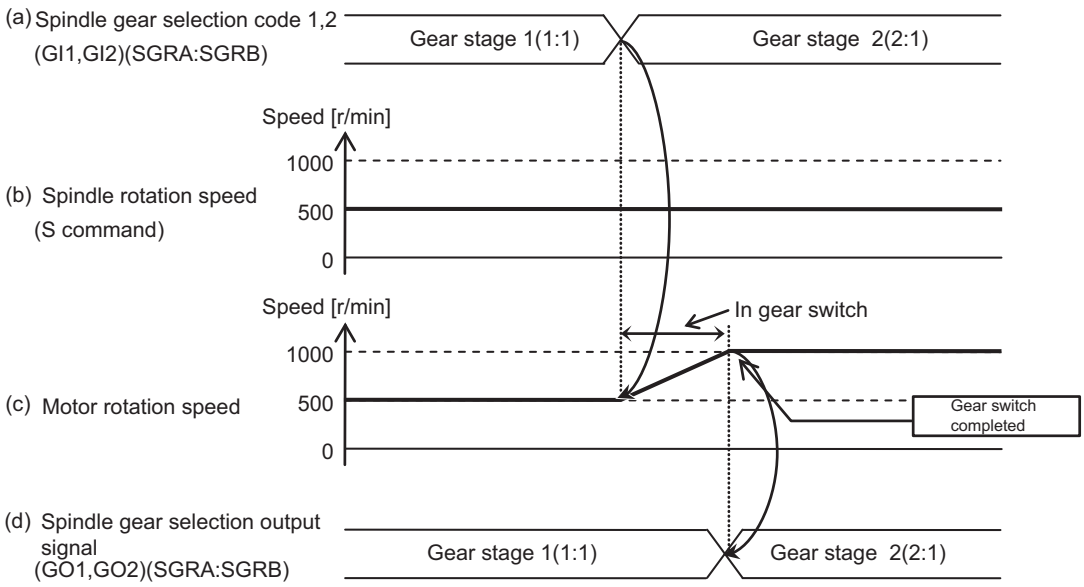
This signal informs which gear stage the spindle gear is at.

[Operation]

The gear stage of the spindle gear is output with a 2-bit (GO1, GO2) code.

Mismatch between the "Spindle gear selection code 1, 2" signal (GI1, GI2) and the "Spindle gear selection output" signal (GO1, GO2) during gear shift means that the gear shift operation is in progress.

When gear shift is completed, the gear stage of the "Spindle gear selection output" signal (GO1, GO2) changes and becomes the same as the "Spindle gear selection code 1, 2" signal (GI1, GI2).



The relation of the gear stage and the "Spindle gear selection output (GO1,GO2)" signal is shown in the following table.

Gear stage	Spindle gear selection output	
	G01	G02
1	0	0
2	1	0
3	0	1
4	1	1

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Spindle oscillation in progress		X18C8	X1928	X1988	X19E8	X1A48	X1AA8	X1B08	X1B68

[Function]

This signal informs that the spindle oscillation is in operation.

[Operation]

This signal turns ON when the spindle oscillation is started.

This signal turns OFF when the spindle oscillation is stopped

[Related signals]

(1) Spindle oscillation command (Y18C8)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	REAL-TIME TUNING 1: SPEED GAIN HOLD-DOWN ON	VGHLD	X18CA	X192A	X198A	X19EA	X1A4A	X1AAA	X1B0A	X1B6A

[Function]

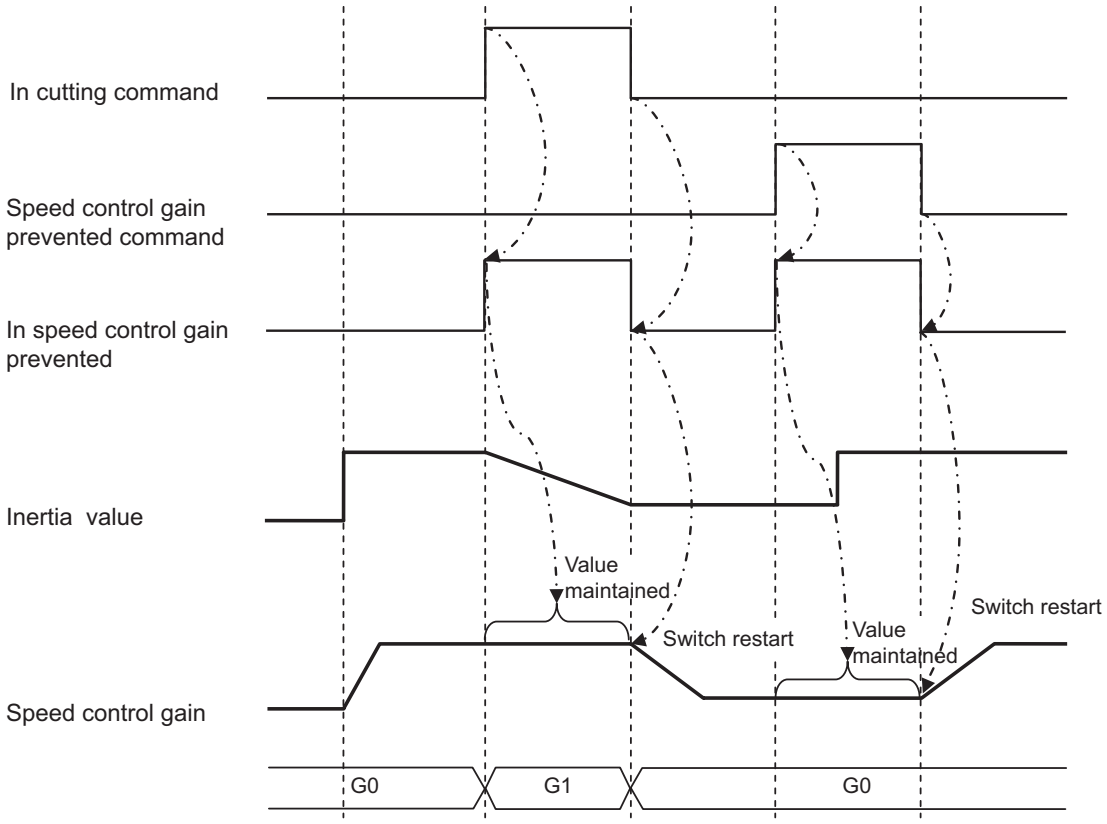
This signal indicates that speed control gain switching is currently stopped in the real-time tuning 1 function.

[Operation]

This signal indicates that speed control gain switching is stopped and the value of speed control gain is retained.

This signal is output when the "Speed control gain hold-down command" is ON or when the cutting command modal is effective regardless of whether this function is enabled or disabled.

This signal is not output when speed control gain switching is performed. Also, the signal is not output when the option is set to OFF.



[Related signals]

(1) Real-time tuning 1: Speed control gain hold-down command (VGHLDC:Y18CA)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	HANDY TERMINAL KEY 1 TO 45		X1CD0 to FC

[Function] [Operation]

This signal indicates the status of handy terminal key 1 to 45.

[Related signals]

(1) Handle pulse encoder communication connector priority (Y70D)
(2) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(3) Handle/incremental feed magnification method selection (MPS: YC87)
(4) Handy terminal Data area top address (R297)
(5) Handy terminal Data valid number of registers (R298)
(6) Handy terminal Cause of communication error (R299)
(7) 1st handle/incremental feed magnification (R2508, R2509)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	POSITION SWITCH 1 to 24	PSW1 to 24	X1D00 to 17	X1D20 to 37	X1D40 to 57	X1D60 to 77	X1D80 to 97	X1DA0 to B7	X1DC0 to D7	X1DE0 to F7

[Function]

This signal notifies that the machine position is within the area set by the parameters.

[Operation]

This signal turns ON when the control axis machine position reaches the range set by the parameters, and turns OFF when the range is left. The axis name and range are set in parameters #7501 to #7734.

The validity of this signal differs in the following manner depending on the absolute position detection or incremental detection.

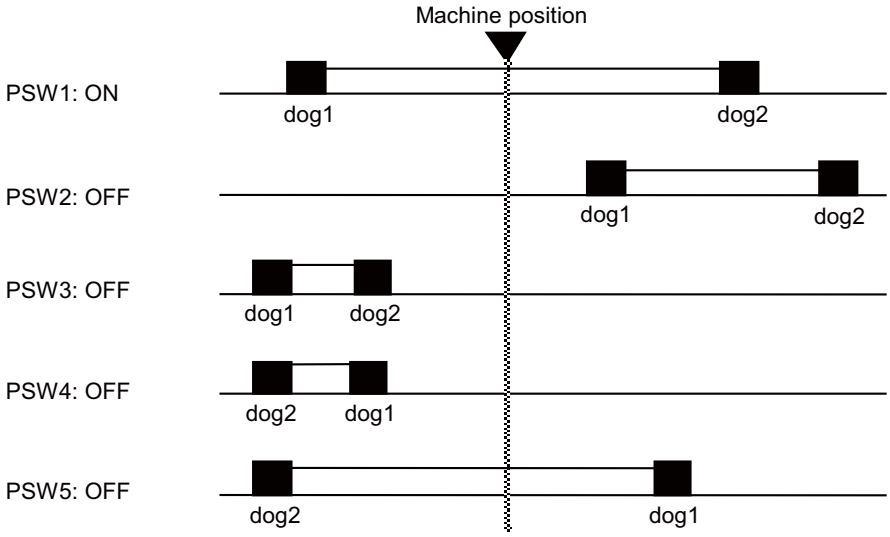
<For absolute position detection system>

This signal is valid when the power is turned ON after zero point initialization is completed.

<For incremental position detection system>

This signal is not validated until the first reference position return is completed after the power is turned ON. (PSW1 to PSW24 will all remain OFF until this signal is validated.)

Example of signal output



The setting range of the position switch uses the basic machine coordinate system as a reference.

The dog1 and dog2 setting values can be set to any size, and the area between the smaller setting and the larger setting will be used as the signal output range.

A slight delay will occur in the output signal fluctuation due to the actual machine position. This maximum delay time (tmax), which depends on the area check method parameters #7504 to #7734, is as follows. Also consider the delay by the scan time as it depends on scan time for the ladder.

When parameter is set to "0" (commanded machine position)	When parameter is set to 1 (detector FB position)
tmax = 0.004 - TP [s]	tmax = 0.004 [s]

TP : Position loop time constant ($\frac{1}{PGN}$ [s])

PGN : Position loop gain

4.2 PLC Input Signals (Data Type: R***)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	ANALOG INPUT m	AIn	R0 to 7

[Function]

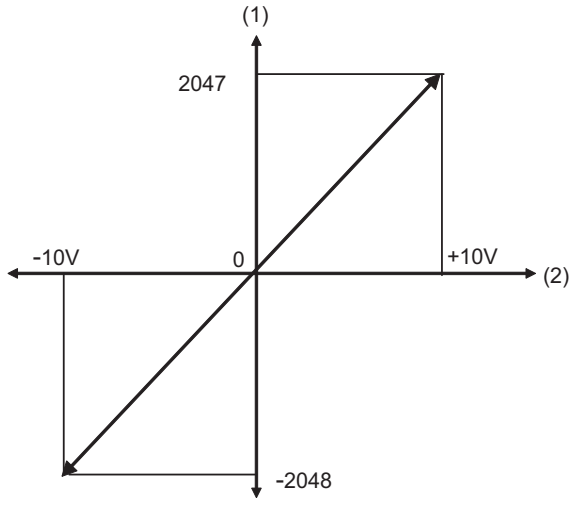
When an analog voltage is input to the designated connector on the remote I/O unit or built-in AI/AO, which has the analog input function, the corresponding data can be read into the specified file register.

[Operation]

The following shows the interfaces.

Channel	File register	Data update cycle
AI0	R0	< Remote I/O unit with the analog input function > One channel is input per PC high-speed cycle. If one station has four channels, the four channels are input in four PC high-speed cycle times. < Built-in AI/AO > All channels are input per PC high-speed cycle. All analog input of four channels are input in one PC high-speed cycle time.
AI1	R1	
AI2	R2	
AI3	R3	
AI4	R4	
AI5	R5	
AI6	R6	
AI7	R7	

<How input voltages are read into the file registers>



Resolution: 20V/4095=4.88mv
Precision: Within +/-25mV
Max. input rating: ± 15V

(1) Value in the file register
(2) Analog input voltage

(Example 1)
An input of +5V enters the value "1024" (400 in hexadecimal) into the file register.

(Example 2)
An input of -6V enters the value "-1229" (FB33 in hexadecimal) into the file register.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	KEY IN 1		R8

[Function]

Operator's key operation can be monitored on the user PLC side.

This signal is available with 70 Series only.

[Operation]

While operator is using the keyboard, the corresponding data is set to KEY-IN 1.

[Related signals]

(1) KEY OUT 1 (R212)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	CLOCK DATA YEAR/MONTH		R11
A	CLOCK DATA DATE/HOUR		R12
A	CLOCK DATA MINUTE/SECOND		R13

[Function]

The year, month, date, hour, minute, second and millisecond data is informed by the controller to the PLC as the current clock information.

[Operation]

The date and time data is output as shown below. The data is output as binary data.

R11	Month	Year
R12	Hour	Date
R13	Second	Minute

(Example) For September 26, 2004, 14:56:36.

R11 ... 0 0 0 0 1 0 1 0 (October) 0 0 0 0 0 0 1 0 (2002) = 0A02H

R12 ... 0 0 0 0 1 1 1 0 (14 hundred hours) 0 0 0 1 1 0 1 0 (26th day) = 0E1AH

R13 ... 0 0 1 0 0 1 0 0 (36 seconds) 0 0 1 1 1 0 0 0 (56 minutes) = 2438H

(Note 1) The time is displayed with the 24-hour system.

(Note 2) The data and time are set with the [TIME] screen on the setting and display unit.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	CNC SOFTWARE VERSION CODE		R16 to 9

[Function]

This indicates the CNC software version.

[Operation]

The version displayed at "MP" on the [Software Directory] screen is indicated.

```
[S/W MODULE TREE]      ALARM/DIAGN   8.1/2
MP BND -  1003W002 - A0A    SV1   BND-
OFFM
```

The file registers R16 to 19 are set to the following data.

(Example) BND-1003W002-A0A

(1) (2) (3)

Item		File register	Type	Example
(1)	Model function No.	R19	Binary	1003=03EBH
(2)	Serial No.	R18	Binary	002=0002H
(3)	Version	Bits F to 8 of R17	ASCII code	A=41H
		Bits 7 to 0 of R17	ASCII code	0=30H
		Bits F to 8 of R16	ASCII code (Note1)	A=41H
-	-	Bits 7 to 0 of R16	Always 20H (Note2)	

(Note 1) If the version is a 2-digit No., bits F to 8 of R16 are set to "20H".

(Note 2) Bits 7 to 0 on the R16 are always "20H".

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	REMOTE PROGRAM INPUT ERROR INFORMATION		R30

[Function][Operation]

Refer to the section on "Remote program input start" signal for the function and operation.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) In remote program input (X724)
(2) Remote program input completion (X725)
(3) Remote program input error (X726)
(4) Remote program input start (Y76C)
(5) Remote program input No. (R352,R353)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	BATTERY DROP CAUSE		R56

[Function]

This notifies a drop in the battery voltage.

[Operation]

A drop in voltage of the data storage battery located on the front door of the controller is checked when the power is turned ON. If the voltage is below the specified voltage (approx. 2.6V), the battery alarm (BATAL) signal turns ON, and bit 0 of this data is set to "1".

(Note) This data will not change until the battery voltage is recovered to a normal value.

[Related signals]

(1) Battery alarm (BATAL: X70F)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	TEMPERATURE WARNING CAUSE		R57

[Function]

If the internal temperature of the control unit rises above 80°C, the overheat will be detected, and the following states will occur.

(1) The "Temperature rise" (SM16) is turned ON.
(2) The "Temperature warning cause" (R57) is turned ON.
(3) The alarm message (Z53) is displayed on the screen.

If the machine is in automatic operation, the operation will be continued, but restarting will not be possible after resetting or stopping with M02/M30. (Starting will be possible after block stop or feed hold.)

[Operation]

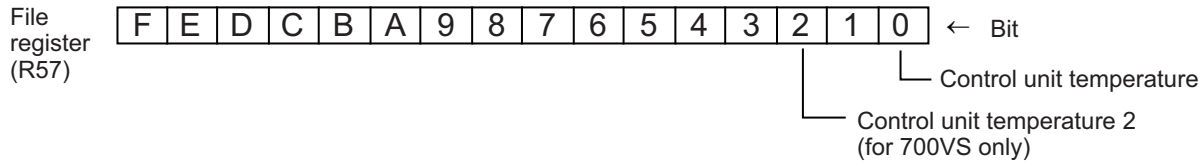
<The "Temperature warning cause" is turned ON when:>

- The internal temperature of the control unit rises above 80°C.

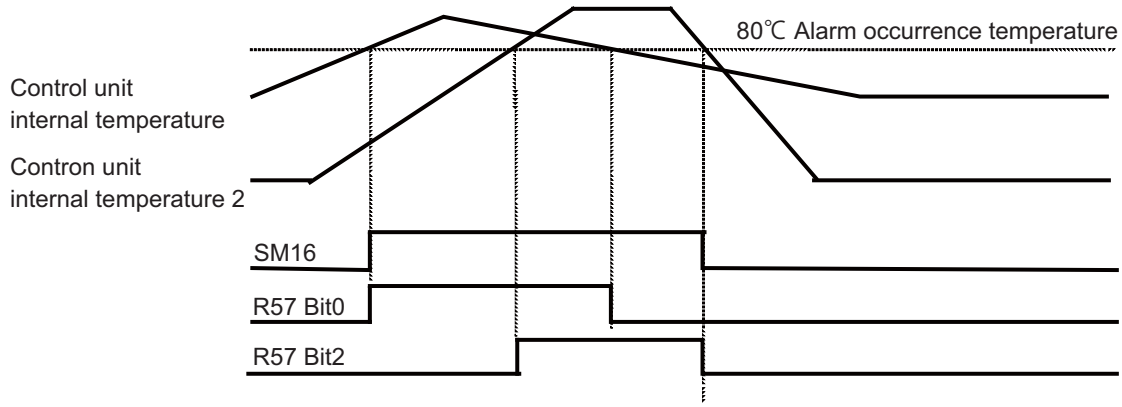
<The "Temperature warning cause" is turned OFF when:>

- The internal temperature of control unit drops below 80°C.

The "Temperature warning cause" is a bit unit signal.



<Operation example>



[Related signals]

(1) Temperature rise (SM16)
(2) Control unit temperature (R60)
(3) Control unit temperature 2 (R59)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	CONTROL UNIT TEMPERATURE 2		R59

[Function]

This signal indicates the temperature in the control unit. Available only for 700VS Series.

[Operation]

This signal indicates the temperature in the control unit. The unit is "°C".

[Related signals]

(1) Temperature rise (SM16)
(2) Temperature warning cause (R57)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	CONTROL UNIT TEMPERATURE		R60

[Function]

This signal indicates the temperature in the control unit.

[Operation]

This signal indicates the temperature in the control unit. The unit is "°C".

[Related signals]

(1) Temperature rise (SM16)

(2) Temperature warning cause (R57)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	TOOL ID COMMUNICATION ERROR INFORMATION		R62

[Function]

The error information at the transmission and reception with the tool ID controller is set.

[Operation]

Whether an error has occurred in finishing the transmission and reception with the tool ID controller (falling edge of X727) or not is set. "0" is set in normally ending, a code other than "0" is set when an error occurs.

The error information is cleared (set to "0") in starting the transmission and reception with the tool ID controller.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

(2) For details on error, refer to the table below.

Error code	Error details	Remedies
0	Normal	-
1	Host -> controller Flaming	Confirm whether the connection and setting are correct.
2	Host -> controller Parity error in one character	Confirm whether the connection and setting are correct.
3	Host -> controller Communication format error	Confirm whether the connection and setting are correct.
4	Host -> controller Check sum error	Confirm whether the connection and setting are correct.
5	Host designated writing to the protect area.	Confirm whether the connection and setting are correct.
6	ID label incompatible error	The tool No. of data to be written is different from the tool No. in the ID label. Confirm the data to be written and the tool. When the tool data is written newly, designate an unset tool.
7	Controller’s hardware error	The body of the tool ID may be damaged.
8	Reading error between controller and ID label	Confirm the distance between the ID antenna and the ID chip.
9	Writing error between controller and ID label	Confirm the distance between the ID antenna and the ID chip. If the distance has no problem, the verify error is occurring. Execute writing repeatedly until writing is executed normally.
10	Unformatted error	Execute the "#1060" (SETUP).
11	Tool position acquirement error	Confirm that the value designated in R336 is correct. Confirm that the designated tool No. exists.
12	No reply error	Confirm whether the connection and setting are correct. *1
13	No. of received characters over error	Confirm whether the connection and setting are correct. *1
14	Received character check sum error	Confirm whether the connection and setting are correct. *1
15	Sort executing error	Execute the writing operation at some intervals.
16	No. of tools over error	The No. of registered tools reaches the maximum value.
17	T4-digit designation error	Change the program T command to the T8-digit.
18	Tool No. duplication error	The same tool No. as the tool No. of the data to be read already exists in the NC. Confirm the data to be read and the tool.
19	Tool ID option invalid error	Validate the tool ID option.
20	Tool ID incompatible format error	After validating the tool ID option, execute the #1060 (SETUP).
-2	Channel duplication open error	Confirm whether the connection and setting are correct. *1
-4	Time out error	Confirm whether the connection and setting are correct. *1
-5	Physical error	Confirm whether the connection and setting are correct. *1
-7	Reset end error	Confirm whether the connection and setting are correct. *1
-10	Input/output device connection error	Confirm whether the connection is correct. *1
-15	Parity H error	Confirm whether the connection and setting are correct. *1
-16	Parity V error	Confirm whether the connection and setting are correct. *1
-17	Over run error	Confirm whether the connection and setting are correct. *1
-18	Code translation error 1	Confirm whether the connection and setting are correct. *1
-20	Code translation error 2	Confirm whether the connection and setting are correct. *1

*1: Retry first. If the same error occurs after retrying, confirm that the connection and setting are correct.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PLC MAIN SCAN TIME		R68

[Function]

Time taken for scanning in user PLC can be monitored.

[Operation]

Scanning time for user PLC main processing is continuously updated and set.

<File register contents and time calculation>

File register	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0

Time calculation

$$\frac{\boxed{\text{Data}}}{256} \times 3.5\,(\text{ms})$$

(Example)

F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0

$$\frac{\boxed{\text{Data}=208}}{256} \times 3.5\,(\text{ms})$$

(Note 1) For this data, mean scanning time is about 0.9sec.

(Note 2) I/O processing time for PLC control software (PLC BASIC) is included in this data processing time.

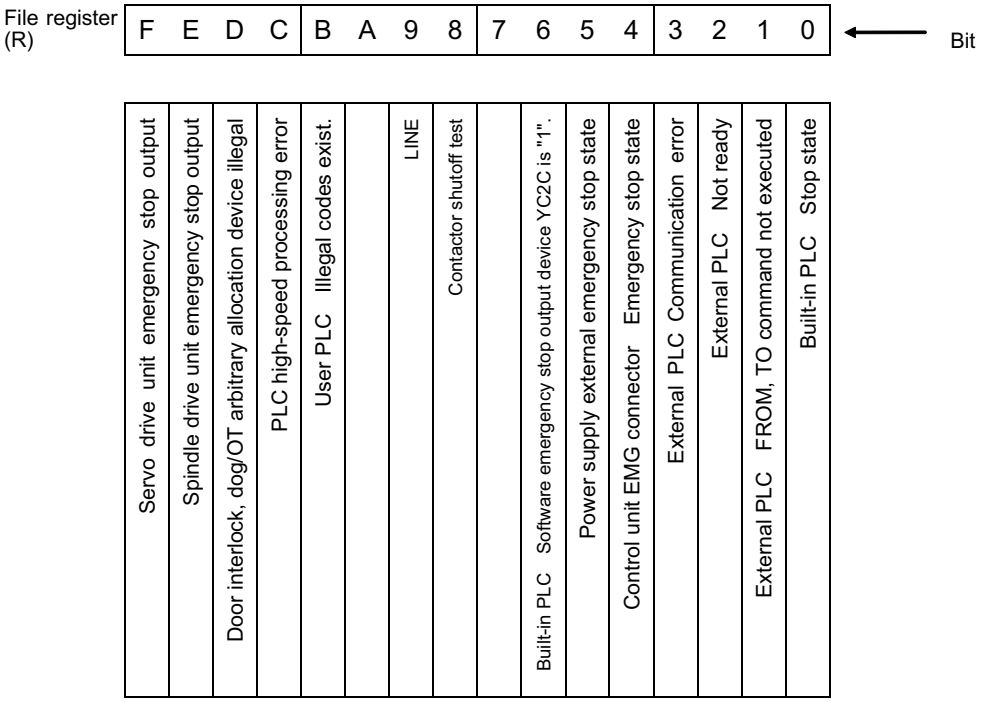
Con-tact	Signal name	Signal abbreviation	Common for part systems
A	EMERGENCY STOP CAUSE		R69

[Function]

The causes of emergency stop are shown with bit correspondence.

[Operation]

The cause of the emergency stop state is shown as follows with bit correspondence.
If there are multiple causes, the multiple bits corresponding to each cause are output.
The bit of this signal that is set to "0" is the emergency stop cause.


File register (R)
F E D C B A 9 8 7 6 5 4 3 2 1 0
Bit
Servo drive unit emergency stop output
Spindle drive unit emergency stop output
Door interlock, dog/OT arbitrary allocation device illegal
PLC high-speed processing error
User PLC Illegal codes exist.
LINE
Contactor shutoff test
Built-in PLC Software emergency stop output device YC2C is "1".
Power supply external emergency stop state
Control unit EMG connector Emergency stop state
External PLC Communication error
External PLC Not ready
External PLC FROM, TO command not executed
Built-in PLC Stop state

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	DIO CARD INFORMATION		R70

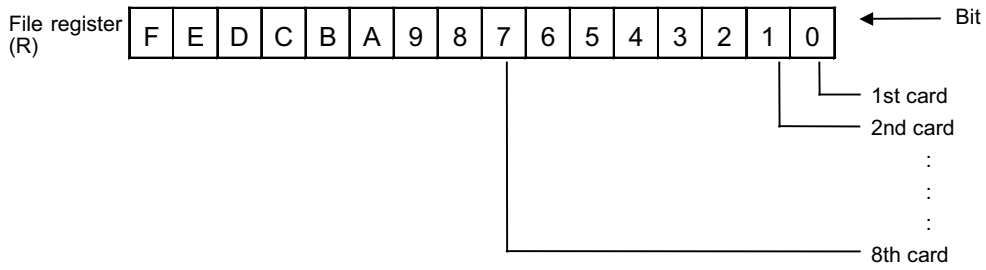
[Function]

The remote I/O unit connected to the controller can be found with the user PLC.

The user PLC finds the connection state of the remote I/O unit with this data.

[Operation]

(1) When a remote I/O card is connected "1" is set, and when not connected "0" is set. Note that for remote I/O unit, DX120/121 and DX140/141, two cards are used per unit, so the two bits corresponding to the connected unit will be set to "1".



(2) No. of cards mounted in remote I/O unit (DX***)

Unit	No. of cards
DX100/101	1 card
DX110/111,DX120/121,DX140/141	2 cards

(3) The position of the bit that turns ON depends on the rotary switch on the remote I/O unit.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	BALL SCREW THERMAL DISPLACEMENT COMPENSA-TION COMPENSATION AMOUNT n-TH AXIS		R72 to 5

[Function] [Operation]

Thermal expansion compensation amount for the current machine position is set by NC.

Refer to the section on "Ball screw thermal displacement compensation offset amount" (R400) for details.

Device No.	Signal name
R72	Ball screw thermal displacement compensation compensation amount 1st axis
R73	Ball screw thermal displacement compensation compensation amount 2nd axis
R74	Ball screw thermal displacement compensation compensation amount 3rd axis
R75	Ball screw thermal displacement compensation compensation amount 4th axis

[Related signals]

(1) Ball screw thermal displacement compensation offset amount n-th axis (R400)

(2) Ball screw thermal displacement compensation max. compensation amount n-th axis (R401)

(3) Ball screw thermal displacement compensation part system, axis No. n-th axis (R402)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus/RTU RECEIVED PACKET MONITOR		R83

[Function]

This signal monitors the number of packets received from Modbus/RTU master station.

The communication cycle can be calculated from the count of received packets per unit time.

[Operation]

The number of packets is counted as the packet is received from each Modbus/RTU master station.

When the power is turned ON, it is initialized to "0".

It returns to "0" when counting from "65535".

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus/RTU COMMUNICATION ERROR MONITOR		R84

[Function]

This signal indicates the error state of Modbus/RTC communication.

[Operation]

If the Modbus/RTU communication error is detected, the error cord will be stored.

The error cord is overwritten when another error is detected so that it always stores the latest error code.

When the power is turned ON, it is initialized to "0".

Error code value	Error type	Error description
1	RS232C port in use	Other function is using the RS232C port.
3	Device preparation is incomplete	The other side's device is not ready.
4	Frame error	RS232C's frame is illegal.
6	Parity error	Parity is illegal.
9	Time-out error	Time-out error occurs.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus/TCP CONNECTION REQUEST MONITOR		R90

[Function]

This signal monitors the connection request from Modbus and TCP master station.

If an error, such as time-out, occurs and then reconnect, the count for the connection request increases.

Normally, the number of connected stations is counted.

[Operation]

Every time the connection is requested from Modbus/TCP master station, the count increases by one.

When the power is turned ON, it is initialized to "0".

It returns to "0" when counting from "65535".

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus/TCP NUMBER OF CONNECTIONS MONITOR		R91

[Function]

This signal monitors the number of connected Modbus/TCP master stations.
If it does not match with the number of master stations to connect, it checks the connection destinations.
When "0" is set, it means that no connected master station exists.

[Operation]

The count increases by one when the connection to Modbus/TCP master is established. When the connection is terminated, the count decreases by one.
When the power is turned ON, it is initialized to "0".

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus/TCP RECEIVED PACKET MONITOR		R92

[Function]

This signal monitors the number of packets received from Modbus/TCP master station.
The communication cycle can be calculated from the count of received packets per unit time.

[Operation]

The number of packets is counted as the packet is received from each Modbus/TCP master station.
The count increases by one every time 100 packets are received. It is commonly counted for each station.
When the power is turned ON, it is initialized to "0".
It returns to "0" when counting from "65535".

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus/TCP COMMUNICATION ERROR MONITOR		R93

[Function]

This signal indicates the error state during Modbus/TCP communication.

[Operation]

If an error is detected during Modbus/TCP communication, the error cord will be stored.
The error cord is overwritten when another error is detected so that it always stores the latest error code.
When the power is turned ON, it is initialized to "0".

Error code value	Error type	Error description
1	Socket open error	An error occured when connecting to Ethernet I/F.
2	bind error	An error occurred when allocating the address.
3	listen error	An error occurred during transition to the connection request acceptance state.
4	accept error	An error occurred when answering the connection request (server).
5	Data receive error	An error occurred while receiving data.
6	Number of data receive errors	The number of received data is illegal.
7	Number of data receive errors	An error occurred while sending data.
8	Number of concurrent connection over	Number of connection requests exceeded the concurrent connection limit.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus PROTCOL ERROR PACKET MONITOR		R94

[Function]

This signal monitors the Modbus protocol packet error.

This signal is used commonly for Modbus/TCP and Modbus/RTU.

[Operation]

An exceptional response is returned when an error occurred to the received Modbus packet. This signal stores the exceptional code of that time.

The error cord is overwritten when another error is detected so that it always stores the latest error code.

When the power is turned ON, it is initialized to "0".

Exceptional code	Name	Description
01	Illegal function	Illegal function code that is not supported.
02	Illegal data address	Specified data address does not exist in the slave.
03	Illegal data	Data is out of range or illegal value
04	Device access failed	Some failure occurred when accessing to the slave device.

[Caution]

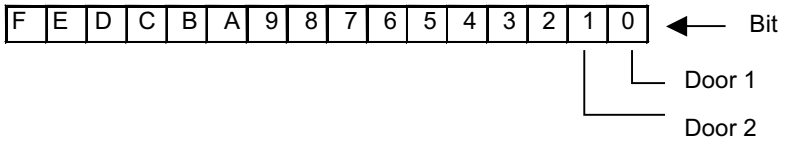
(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	SPEED MONITOR DOOR OPEN POSSIBLE	SMDOEN	R96

[Function]

This signal executes speed monitor function for the control axis for which a valid door No. is selected with parameter "#2118 SscDrSel" and the spindle for which a valid door No. is selected with parameter "#3071 SscDrSelSP". Then the signal notifies that the selected door can be opened.

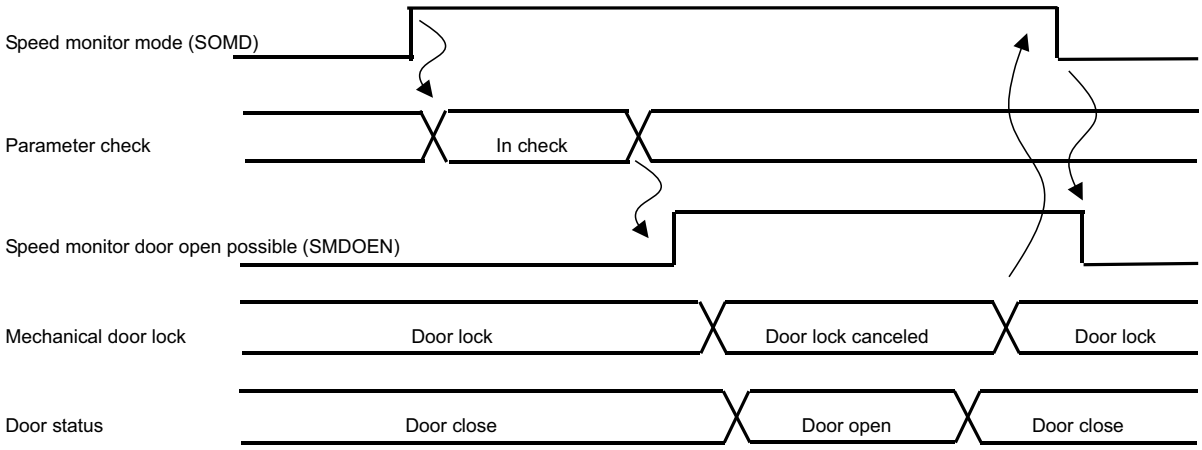
The door No. corresponds to the following bits.



[Operation]

When both NC and drive unit start the speed monitor function with the speed monitor mode turned ON and speed monitor parameter check completed, the speed monitor door open signal will turn ON.

When the speed monitor mode is OFF, the speed monitor door open possible signal is OFF as well.



[Caution]

When using the speed monitor function, create user PLC that enables door open when the speed monitor door open possible signal is ON.

[Related signals]

(1) Speed monitor mode (SOMD:R296)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	HANDLE FEED: 1ST HANDLE PULSE COUNTER	HS1PCNT	R116

[Function]

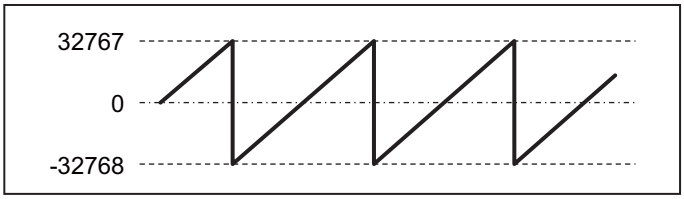
This signal indicates the 1st handle pulses (position).

[Operation]

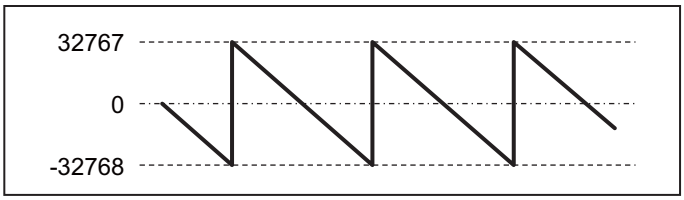
The number of pulses are increased/decreased according to the direction in which the 1st handle is turned. (Range of increase/decrease: -32768 to 32767)

The following examples show how the number of pulses changes as you turn the handle.

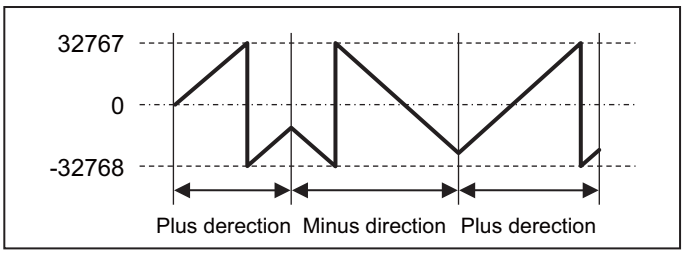
Example 1) Change of pulses when you turn the handle continuously in plus direction



Example 2) Change of pulses when you turn the handle continuously in minus direction



Example 3) Change of pulses when you turn the handle in plus and minus directions alternately

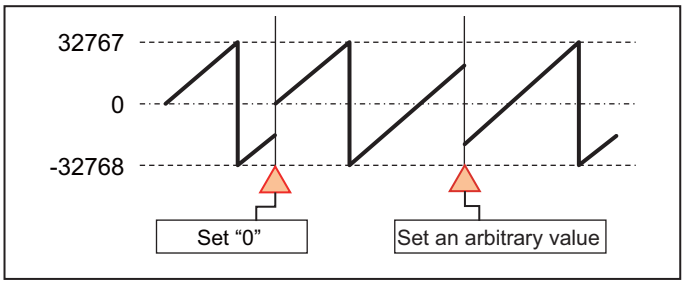


When the power supply is turned ON, the number of pulses is "0".

This value can be changed arbitrarily using the ladder, etc.

After the change, the number of pulses will increase/decrease starting from the changed value.

Example 4) Change of pulses when the value is changed during plus-direction operation.



The number of pulses will increase/decrease as you turn the handle regardless of the operation mode.
For both 5V handle and 12V handle, the number of pulses will increase/decrease in increments of 1 pulse per notch.
The handle rotation direction can be determined by calculating the amount of change per scan in the ladder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	HANDLE FEED: 2ND HANDLE PULSE COUNTER	HS2PCNT	R117

[Function]

This signal indicates the 2nd handle pulses (position).

[Operation]

The number of pulses are increased/decreased according to the direction in which the 2nd handle is turned.
For further explanation, refer to the section for the 1st handle pulse counter.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	HANDLE FEED: 3RD HANDLE PULSE COUNTER	HS3PCNT	R118

[Function]

This signal indicates the 3rd handle pulses (position).

[Operation]

The number of pulses are increased/decreased according to the direction in which the 3rd handle is turned.
For further explanation, refer to the section for the 1st handle pulse counter.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	POWER CONSUMPTION COMPUTATION: PRESENT CONSUMPTION OF ENTIRE DRIVE SYSTEM	DTPPC	R120, 1

[Function]

This signal notifies the present consumption of entire drive system.

[Operation]

The present consumption of entire drive system is set.
The present consumption of entire drive system is the sum of present power consumption of servo axis in drive system (fluctuating part), present power consumption of spindle in drive system (fluctuating part), drive system's fixed consumption (base common #1464), and drive system's fixed consumption correction (R306, 7).
Setting size = 2 words, Setting unit = 1 (W), Setting range = -2147483648 to 2147483647 (W)

[Caution]

(Note 1) The positive value represents power consumption and the negative value represents power regeneration.

[Related signal]

(1) Power consumption computation: Drive system's fixed consumption correction (DFPCC:R306, 7)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	POWER CONSUMPTION COMPUTATION: ACCUMULATED CONSUMPTION OF ENTIRE DRIVE SYSTEM 1 to 4	DTIPC1 to 4	R122 to 9

[Function]

This signal notifies the accumulated consumption of entire drive system.

[Operation]

The accumulated consumption of entire drive unit is set.

The accumulated consumption of entire drive system is the accumulation of present power consumption of servo axis in drive system (fluctuating part), present power consumption of spindle in drive system (fluctuating part), drive system's fixed consumption (base common #1464), and drive system's fixed consumption correction (R306, 7).

Setting size = 2 words, Setting unit = 1 (Wh), Setting range = -2147483648 to 2147483647 (Wh)

[Caution]

(Note 1) When the power is turned ON again, the state prior to the power ON is held.

(Note 2) The positive value represents power consumption and the negative value represents power regeneration.

(Note 3) When the accumulated value exceeds the maximum or minimum value of the setting range, each value is clamped to the maximum/minimum value.

[Related signals]

(1) Power consumption computation: Clear consumption accumulation 1 to 4 (IPCC1 to 4:Y700 to 3)

(2) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4:Y724 to 7)

(3) Power consumption computation: Drive system's fixed consumption correction (DFPCC:R306, 7)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	POWER CONSUMPTION COMPUTATION: ACCUMULATED CONSUMPTION OF DEVICES OTHER THAN DRIVE SYSTEM 1 to 4	NDIPC1 to 4	R130 to 7

[Function]

This signal notifies the accumulated value of total power consumption of devices other than drive system.

[Operation]

The accumulated consumption of devices other than drive system is set.

The accumulated consumption of devices other than drive system is the accumulation of power consumption of devices other than drive system (R304, 5).

Setting size = 2 words, Setting unit = 1 (Wh), Setting range = -2147483648 to 2147483647 (Wh)

[Caution]

(Note 1) When the power is turned ON again, the state prior to the power ON is held.

(Note 2) The positive value represents power consumption and the negative value represents power regeneration.

(Note 3) When the accumulated value exceeds the maximum or minimum value of the setting range, each value is clamped to the maximum/minimum value.

[Related signals]

(1) Power consumption computation: Clear consumption accumulation 1 to 4 (IPCC1 to 4:Y700 to 3)

(2) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4:Y724 to 7)

(3) Power consumption computation: Consumption of devices other than drive system (NDPC:R304, 5)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	PLC AXIS ALARM/WARNING NO. N-TH AXIS		R168 to R173

[Function]

This signal indicates the alarm No./warning No. of the servo drive unit for PLC axis. (hexadecimal 2 digits)

This signal sets the 4-digit alarm No. which is displayed on the NC screen.

[Operation]

This signal is set up when the alarm/waring occurs in the servo drive unit for PLC axis.

This signal will be cleared when the alarm/warning is canceled.

This signal does not set if the servo warning "S52 Control axis detach warning 00E6" or "S52 In NC emergency stop state 00E7" occurs.

If more than one alarm/warning occurs, the value displayed in the [LED display] of [Drive motor]-[Servo unit] screen is set.

[Related signals]

(1) NC warning (servo warning) (XC9C)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M CODE DATA 1		R504,5	R704,5	R904,5	R1104,5	R1304,5	R1504,5	R1704,5	R1904,5

[Function]

When M function is specified, value following address "M" can be identified. The M code data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12006 Mbin".

[Operation]

M code data are updated when:

(1) "M**" is issued in automatic operation (tape, memory or MDI).

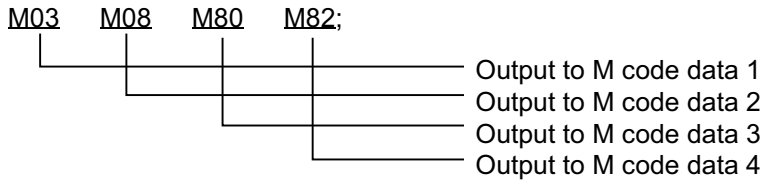
(2) "M**" in fixed cycle causes motion during execution of the fixed cycle.

(3) "M**" is executed by manual numerical command input.

M code data is also updated when an "M code independent output" command is issued even during M function lock. The data is kept unchanged after "M function finish" signal (FIN1, FIN2) is sent back. "Reset" or "Emergency stop" does not clear the data.

[Caution]

(1) Commands can be defined up to four in a block with parameters. When plural M functions are placed in one block, the signals are output in the order at programming.



(2) M98 (read of subprogram), M99 (return to main program), etc. are processed within the CNC, and not output as M code data.

[Related signals]

(1) M function strobe (MFn:XC60)

(2) M code data 2, 3, 4 (R506 to 11)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M CODE DATA 2		R506,7	R706,7	R906,7	R1106,7	R1306,7	R1506,7	R1706,7	R1906,7

[Function]

When M function is specified, value following address "M" can be identified. The M code data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12006 Mbin".

[Operation]

M code data 2 are updated when:

(1) Two or more M functions are placed in one block in automatic operation (tape, memory or MDI).

For other details, refer to the section on "M CODE DATA 1"

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M CODE DATA 3		R508,9	R708,9	R908,9	R1108,9	R1308,9	R1508,9	R1708,9	R1908,9

[Function]

When M function is specified, value following address "M" can be identified. The M code data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12006 Mbin".

[Operation]

M code data 3 are updated when:

(1) Three or more M functions are placed in one block in automatic operation (tape, memory or MDI).

For other details, refer to the section on "M CODE DATA 1".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M CODE DATA 4		R510,1	R710,1	R910,1	R1110,1	R1310,1	R1510,1	R1710,1	R1910,1

[Function]

When M function is specified, value following address "M" can be identified. The M code data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12006 Mbin".

[Operation]

M code data 4 are updated when:

(1) Four or more M functions are placed in one block in automatic operation (tape, memory or MDI).

For other details, refer to the section on "M CODE DATA 1".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	S CODE DATA 1 to 8		R512 to 27	R712 to 27	R912 to 27	R1112 to 27	R1312 to 27	R1512 to 27	R1712 to 27	R1912 to 27

[Function]

When S function is specified, value following address "S" can be identified. The S code data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12008 Sbin".

[Operation]

S code data (1 to 8) are updated when:

(1) "S**" is specified in automatic operation (tape, memory or MDI).

(2) "S**" is executed by manual numerical command input.

Data remain unchanged even when "M function finish" signal (FIN1 or FIN2) is sent back. "Reset" and "Emergency stop" does not clear this data.

The S code data is issued in the following manner.

Signal name	Register							
	$1	$2	$3	$4	$5	$6	$7	$8
S code data 1	R512,3	R712,3	R912,3	R1112,3	R1312,3	R1512,3	R1712,3	R1912,3
S code data 2	R514,5	R714,5	R914,5	R1114,5	R1314,5	R1514,5	R1714,5	R1914,5
S code data 3	R516,7	R716,7	R916,7	R1116,7	R1316,7	R1516,7	R1716,7	R1916,7
S code data 4	R518,9	R718,9	R918,9	R1118,9	R1318,9	R1518,9	R1718,9	R1918,9
S code data 5	R520,1	R720,1	R920,1	R1120,1	R1320,1	R1520,1	R1720,1	R1920,1
S code data 6	R522,3	R722,3	R922,3	R1122,3	R1322,3	R1522,3	R1722,3	R1922,3
S code data 7	R524,5	R724,5	R924,5	R1124,5	R1324,5	R1524,5	R1724,5	R1924,5
S code data 8	R526,7	R726,7	R926,7	R1126,7	R1326,7	R1526,7	R1726,7	R1926,7

[Caution]

(1) If two or more S codes for one spindle are issued in a block, the S code defined last will be valid.

[Related signals]

(1) S function strobe (SFn:XC64)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	T CODE DATA 1 to 4		R536 to 43	R736 to 43	R936 to 43	R1136 to 43	R1336 to 43	R1536 to 43	R1736 to 43	R1936 to 43

[Function]

When T function is specified, value following address "T" can be identified. The T code data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12010 Tbin".

[Operation]

T code data (1 to 4) are updated when:

(1) "T**" is specified in automatic operation (tape, memory or MDI).

(2) "T**" is executed by manual numerical command input.

Data remain unchanged even when "M function finish" signal (FIN1 or FIN2) is sent back. "Reset" and "Emergency stop" does not clear this data.

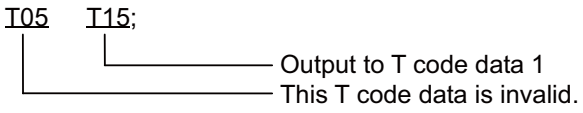
T code data is issued in the following manner.

Signal name	Register			
	$1	$2	$3	$4
T code data 1	R536,7	R736,7	R936,7	R1136,7
T code data 2	R538,9	R738,9	R938,9	R1138,9
T code data 3	R540,1	R740,1	R940,1	R1140,1
T code data 4	R542,3	R742,3	R942,3	R1142,3

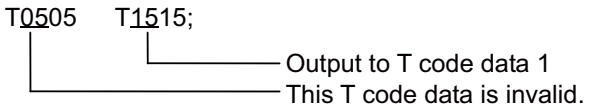
[Caution]

(1) Up to four T codes can be commanded in one block. The latter code will be valid if more than one code is commanded in one block.

[M system]



[L system]



[Related signals]

(1) Tool function strobe 1 (TF1:XC68)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	2ND M FUNCTION DATA 1 to 4		R544 to 51	R744 to 51	R944 to 51	R1144 to 51	R1344 to 51	R1544 to 51	R1744 to 51	R1944 to 51

[Function]

When 2nd M function is specified, value following address "B" can be identified.

The 2nd M function data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12012 Bbin".

Signed binary data can also be output by setting "#1045 nskno".

(Note) Select an address for the 2nd M function address from the machine parameters basic specification parameter "#1170 M2name" A, B or C address that is not being used for "#1013 axname" or "#1014 incax".

[Operation]

2ND M FUNCTION DATA (1 to 4) are updated when:

(1) "B (A, C)**" is specified in automatic operation (tape, memory or MDI).

(2) "B (A, C)**" is executed by manual numerical command input.

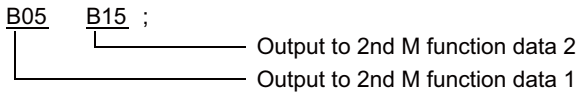
Data remain unchanged even when "M function finish" signal (FIN1 or FIN2) is sent back. "Reset" and "Emergency stop" does not clear this data.

2nd M function data is allocated as shown below.

Signal name	Register			
	$1	$2	$3	$4
2nd M function data 1	R544,5	R744,5	R944,5	R1144,5
2nd M function data 2	R546,7	R746,7	R946,7	R1146,7
2nd M function data 3	R548,9	R748,9	R948,9	R1148,9
2nd M function data 4	R550,1	R750,1	R950,1	R1150,1

[Caution]

(1) Up to four 2nd M functions can be commanded in one block. The latter code will be valid if more than five codes are commanded in one block.



[Related signals]

(1) 2nd M function strobe 1 (BF1:XC6C)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CHOPPING ERROR NO.		R554	R754	R954	R1154	R1354	R1554	R1754	R1954

[Function]

This signal notifies the user PLC the alarm details when an alarm occurs during chopping operation.

[Operation]

Chopping error No. and the details are as shown below.

Error No.	Details	Classification
0	No error	-
1	Number of cycles for chopping is zero. (Operates when the number of cycles is 1)	A
2	(Chopping axis feedrate) > (Cutting feed clamp speed) (The feedrate is clamped at the cutting feed clamp speed.)	A
3	(Acceleration of chopping axis) > (Cutting feed clamp speed)/(Cutting feed time constant) (The acceleration is clamped at (Cutting feed clamp speed)/(Cutting feed time constant))	A
4	(Number of cycles for chopping) > (1056/min) (The number of cycles for chopping is clamped at 1056/min.)	A
5	Chopping axis zero point return is not completed.	B
6	Chopping override is zero.	B
7	Commanded axis is the chopping axis.	B
8	The bottom dead center point position is zero.	B
9	The chopping axis is a manual feed axis.	B
10	Interlock	B
11	Stored stroke limit or stroke end	B
20	There is no specification for chopping.	-
21	Chopping control data area exceeds the R register area designated for the chopping control data. Chopping control data area and compensation amount record area are overlapped. Compensation amount record area exceeds R register's backup area (R8300 to R9799). ((Rm+14 x N sets+4) > 9799)	C
22	Multiple chopping axes are specified by the PLC interface.	C
23	Chopping axis is not specified by either PLC interface or parameter.	C
24	Compensation method is set to other than 0/1.	C
25	The mode for the compensation value fixed method is set to other than 0(playback mode) or 1(record mode).	C
26	Data No. for the control data is a negative value.	C
27	Chopping axis's "#2081 chclsp" (Chopping clamp speed) and "#2002 clamp" (Cutting clamp speed) are both set to "0".	C
28	Chopping axis was changed during chopping operation. (Chopping axis cannot be changed during chopping.)	C
29	Rotary axis was specified as chopping axis.	C
30	Rapid traverse override valid/invalid is set to other than 0(invalid) or 1(valid).	A

Classification A:	The error is retained during chopping operation. The error is cleared at the rising edge of the chopping parameter valid signal after the chopping control data is corrected, or when the NC is reset.
Classification B:	The error is cleared after the alarm factor is removed, or when the NC is reset.
Classification C:	The error is cleared at the falling edge of the chopping parameter valid signal, or when the NC is reset.

[Related signals]

(1) Chopping signal (CHPS:YC30)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL MEASUREMENT STATUS		R555	R755	R955	R1155	R1355	R1555	R1755	R1955

[Function]

This signal indicates measurement status during measurement corresponding to bit.

[Operation]

Measurement status during manual measurement is indicated corresponding to bit.

This register value is displayed on the screen during manual measurement shown as below.

R555	Display	Meaning
bit0	On mea0	Status other than "On mea1 to 6".
bit1	On mea1	Status when a skip signal is input during manual measurement. It will shift to "On mea2" state after deceleration stop is confirmed.
bit2	On mea2	Status during the first retract operation. It will shift to "On mea3" state after completing retraction by the retract amount.
bit3	On mea3	Status in which retract has completed by the retract amount. If the skip signal is ON after confirming deceleration stop, a warning will appear, and status display will remain the same. It will shift to "On mea0" state by resetting.
bit4	On mea4	Status during the second measurement. If the skip signal is not input, even if moving to the designated position, a warning will appear, and status display will remain the same. It will shift to "On mea0" state by resetting.
bit5	On mea5	Status when a skip signal is input during the second measurement. It will shift to "On mea6" state after deceleration stop is confirmed.
bit6	On mea6	Status during the second retract operation. It will shift to "On mea0" state after completing retraction by the retract amount.

[Related signals]

(1) Tool length measurement 1 (TLM:YC20)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : WARNING AXIS		R564	R764	R964	R1164	R1364	R1564	R1764	R1964

[Function]

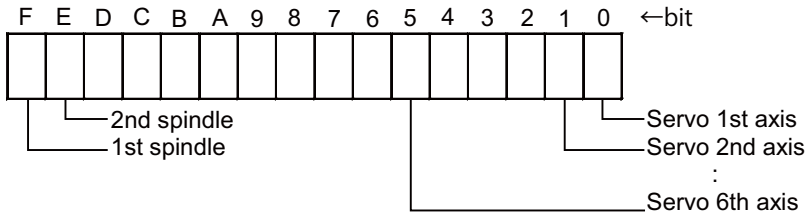
This signal indicates the axis for which a warning occurred during monitor operation.

[Operation]

The bit corresponding to the axis for which the effective load exceeded the warning value during monitor operation is set to "1".

This signal is reset when the alarm reset or warning reset signal is input.

This signal is also reset when the teaching/monitor execution signal is turned OFF.



[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)

(2) Load monitor I : Alarm axis, Data error information (R565,R566)

(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC3 to YCC7)

(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)

(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : ALARM AXIS		R565	R765	R965	R1165	R1365	R1565	R1765	R1965

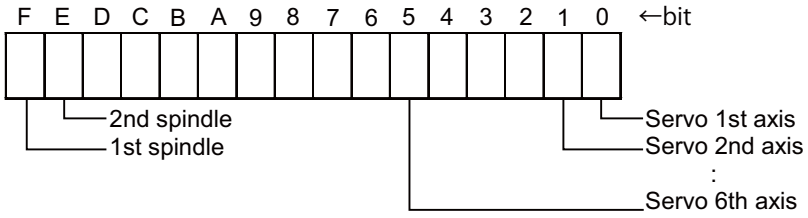
[Function]

This signal indicates the axis for which an alarm occurred during monitor operation.

[Operation]

The bit corresponding to the axis for which the effective load exceeded the alarm value during monitor operation is set to "1".

This signal is reset when the alarm reset signal is input.



[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)

(2) Load monitor I : Warning axis, Data error information (R564,R566)

(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC3 to YCC7)

(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)

(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : DATA ERROR IN-FORMATION		R566	R766	R966	R1166	R1366	R1566	R1766	R1966

[Function]

This signal indicates the error that occurred during load monitor I function.

[Operation]

The corresponding bit shown below is set when an error occurs during load monitor I function.

This signal is reset when the alarm reset signal is input.

Bit0: The teaching data designated during monitoring is not registered. ▲

Bit1: The teaching data alarm value designated during monitoring is smaller than the warning value. ▲

Bit2: The number of teaching data items has exceeded the registration capacity. ▲

Bit3: The teaching data cannot be registered during teaching because there is no teaching time. ▲

The teaching data cannot be registered because no tool is selected. ▲

The teaching data cannot be registered because there is no SUB No. nor axis specification. ▲

Bit8: The upper tolerable value is smaller than the lower tolerable value when executing adaptive control. ▲

Bit9: The override maximum value is smaller than the override minimum value when executing adaptive control. ▲

BitA: The adaptive control basic axis selection command is illegal. ▲

BitB: The setting of “Cutting torque estimation Target axis” is illegal.

BitC: When the parameter "#1164 ATS"is "1", the load monitor I has been executed.

BitF: Load monitor I function operation has been attempted although the option is OFF.

(Note) Signals with " ▲ " are prepared for specific machine tool builders.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)

(2) Load monitor I : Warning axis, Alarm axis (R564, R565)

(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Alarm reset (YCC3 to YCC7)

(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)

(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	GROUP IN TOOL LIFE MANAGEMENT		R567	R767	R967	R1167	R1367	R1567	R1767	R1967

[Function][Operation]

This signal outputs group No. currently in life management with the tool life management II.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : ADAPTIVE CONTROL OVERRIDE		R571	R771	R971	R1171	R1371	R1571	R1771	R1971

[Function]

The override controlled with adaptive control is output.

[Operation]

The override based on the results controlled with adaptive control is output.

100% is always output except during adaptive control.

Output unit: 1/100

(Example) "10000" is output for a 100% override.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Adaptive control in execution (XCA3)

(2) Load monitor I : Adaptive control execution (YCC9)

(3) Load monitor I : Adaptive control basic axis selection (R2583)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CNC COMPLETION STANDBY STATUS		R572	R772	R972	R1172	R1372	R1572	R1772	R1972

[Function]

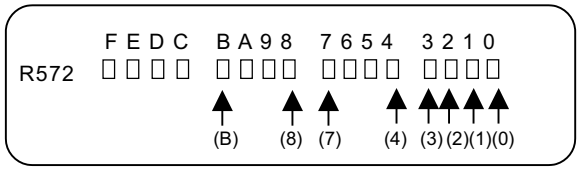
The NC's operation state when the machine seems to be not operated in automatic operation without alarms occurring is output by the bit unit. The alarm messages can be displayed using this signal in the user PLC.

[Operation]

The corresponding bit below turns ON.

Bit0 :Complete standby status of M,S,T,B
Bit1 :In rapid traverse deceleration check
Bit2 :In cutting feed deceleration check
Bit3 :Waiting for spindle orientation complete
Bit4 :Waiting for spindle position loop
Bit7 :Door opened
Bit8 :In executing dwell
BitB :Waiting for unclamp signal

The following figure shows the bit correspondence.



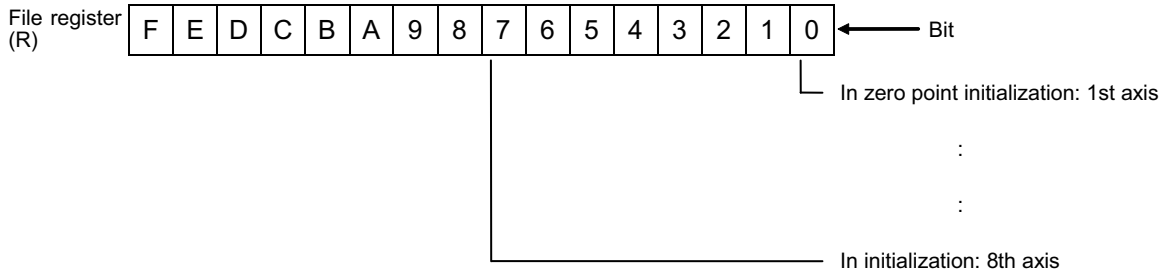
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	N INITIALIZATION		R574	R774	R974	R1174	R1374	R1574	R1774	R1974

[Function]

This signal is output when zero point initialization is being carried out in the absolute position detection system.

[Operation]

The axis for which "1" is set in #0 INIT. SET on the [ABS. POSITION SET] screen is set to "1", and is held until the power is turned OFF.The stored stroke limit and stroke end signals are invalid while this signal is set to "1", and the current limit during initialization is valid.This signal is also set to "1"
when the "Zero point initialization mode" (AZS1 to 8) signal is ON.



Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	INITIALIZATION INCOMPLETION		R575	R775	R975	R1175	R1375	R1575	R1775	R1975

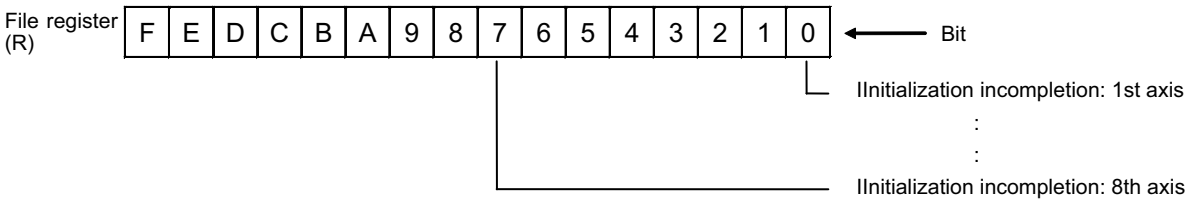
[Function]

This signal is output when the absolute position is not established in the absolute position detection system.

[Operation]

This signal indicates that the zero point initialization has not been established once or that the absolute position has been lost.

The stored stroke limit of the axis for which this signal is set to "1" in the absolute position detection system is invalid.



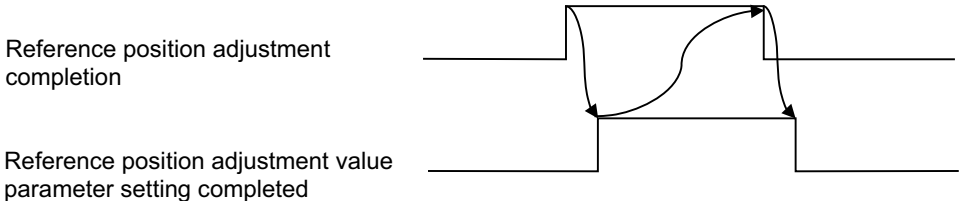
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	REFERENCE POSITION ADJUSTMENT VALUE PARAMETER SETTING COMPLETED		R576	R776	R976	R1176	R1376	R1576	R1776	R1976

[Function] [Operation]

NC receives the "Reference position adjustment completion" signal's ON from PLC. If the axis is controlled for the dog-type reference position return in the synchronization at zero point initialization ("#1493 ref_syn=1"), NC sets the reference position adjustment value to "#2036 slv_adjust" and then turns ON the bit corresponding to the master axis in the part system.

Turn OFF the "Reference position adjustment value completion" signal after this signal is ON.

NC turns this signal OFF when the "Reference position adjustment completion" signal is changed from ON to OFF.



[Caution]

(1) Parameter screen is also available to change the reference position adjustment value (#2036 slv_adjust), which does not turn this signal ON.

[Related signals]

(1) Reference position adjustment completion (R2592)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	USER MACRO SECTION AND SUB-SECTION DESIGNATED EXECUTION RESULT	APIER	R577	R777	R977	R1177	R1377	R1577	R1777	R1977

[Function] [Operation]

This signal sets the result of NC data reading/writing executed from the user macro for which section or sub-section is specified.

In actual operation, the return values of GetNcData() and SetNcData() are not changed when they are output. Therefore, the meaning of the values are the same as displayed on the PLC window, etc.

[Caution]

(1) The values are updated when NC data reading/writing with section/sub-section specification is executed from the user macro.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NEAR REFERENCE POSITION (PERREFERENCE POSI-TION)		R580,1	R780,1	R980,1	R1180,1	R1380,1	R1580,1	R1780,1	R1980,1

[Function]

This signal indicates that the control axis is near the reference position when using the absolute position detection system.

This signal is output for the 1st reference position to the 4th reference position.

Near the 1st reference position, the time for outputting the signal is shorter than the "near reference position n-th axis (NRFn)" signal (the ON/OFF timing accuracy during axis movement is improved).

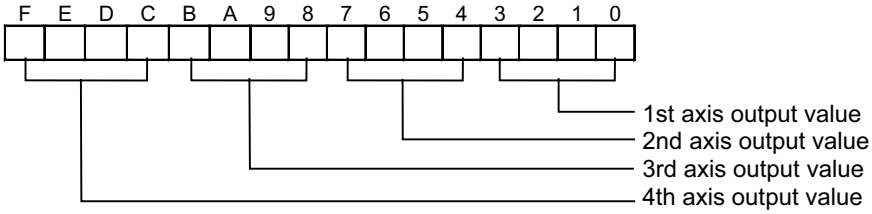
[Operation]

(1) Using the n-th reference position as a reference, when the control axis is in the range set with the parameters, this signal turns ON, and turns OFF when the axis is not within the range.

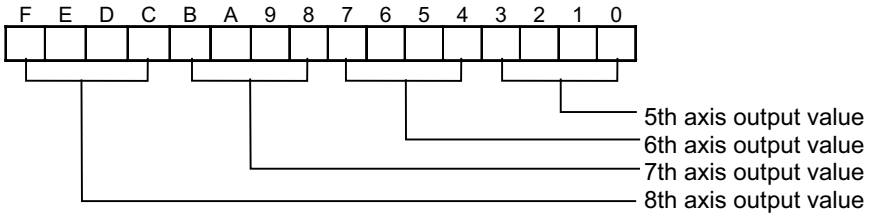
(2) The near reference position signal is output with four bits for each axis.

(a) R register and corresponding axes

R580



R581



(b) Output value and near n-th reference position

High-order bit	<---------->		Low-order bit	Near n-th reference position
0	0	0	1	Near 1st reference position
0	0	1	0	Near 2nd reference position
0	1	0	0	Near 3rd reference position
1	0	0	0	Near 4th reference position

(Note 1) The near reference position signal devices include X devices (NRF1 and following) which output signal only for the 1st reference position, and the R registers (R580/R581) which outputs a signal for each reference position (1st reference position to 4th reference position).

(Note 2) The near reference position signal output width is set with the absolute position parameters "#2057 nrefp" and "#2058 nrefn". The near reference position signal output width is the same width for the 1st reference position to the 4th reference position.

(Note 3) Near the 1st reference position, the signals are output to the conventional X device (NRF1 and following) and the R registers (R580/R581) which output signals to each reference position.

[Related signals]

(1) Near reference position n-th axis (NRF1 to 8:X880 to 7)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	PRESETTER CONTACT		R582	R782	R982	R1182	R1382	R1582	R1782	R1982

[Function]

The axis movement direction at the moment when the "Skip" signal is entered is output in the tool presetter.

[Operation]

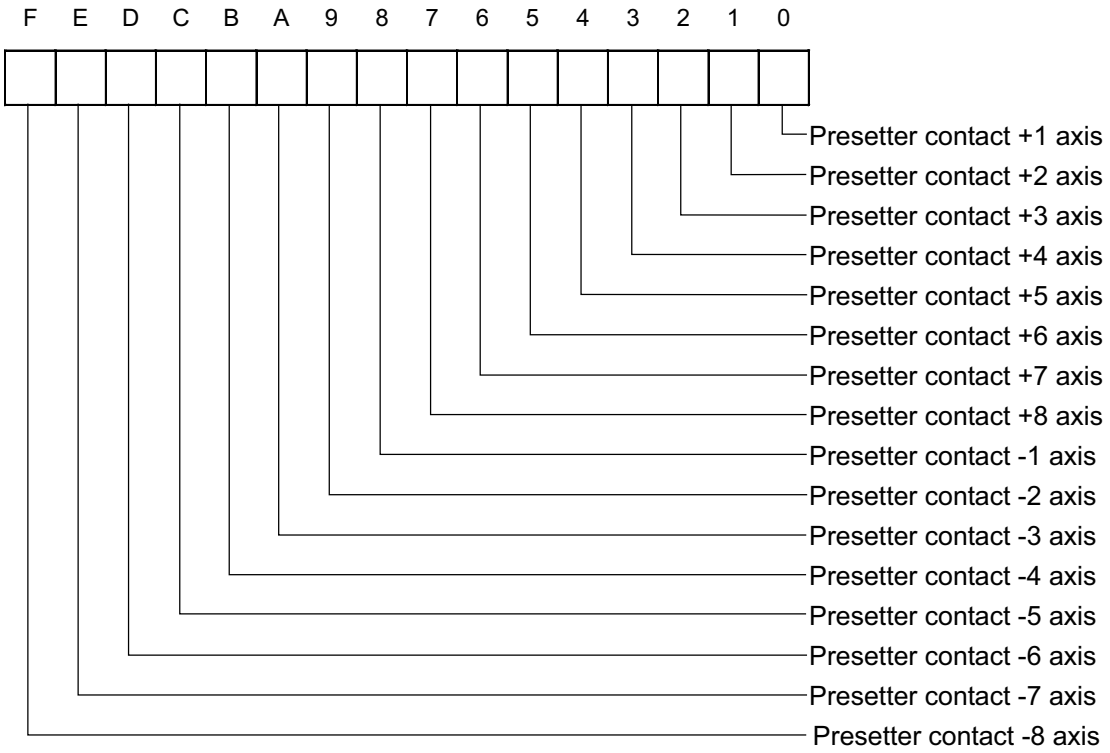
The axis movement direction at the moment when the tool contacts the sensor ("Skip" signal ON) during the tool measurement mode (TLMS ON) is set to the corresponding bit.

This signal is turned OFF by the sensor OFF.

This signal turns OFF when the "Tool measurement mode" signal is turned OFF.

This signal is not output when the tool measurement mode is not entered.

This signal is "0xFFFF" when an axis with no movement contacts the sensor.


F E D C B A 9 8 7 6 5 4 3 2 1 0
Presetter contact +1 axis
Presetter contact +2 axis
Presetter contact +3 axis
Presetter contact +4 axis
Presetter contact +5 axis
Presetter contact +6 axis
Presetter contact +7 axis
Presetter contact +8 axis
Presetter contact -1 axis
Presetter contact -2 axis
Presetter contact -3 axis
Presetter contact -4 axis
Presetter contact -5 axis
Presetter contact -6 axis
Presetter contact -7 axis
Presetter contact -8 axis

1:Sensor ON

0:Sensor OFF or tool measurement mode OFF

[Related signals]

(1) Tool length measurement 2 (TLMS:YC21)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	PRESETTER INTERLOCK		R583	R783	R983	R1183	R1383	R1583	R1783	R1983

[Function]

The interlock direction in the CNC is output after the sensor is entered in the tool presetter.

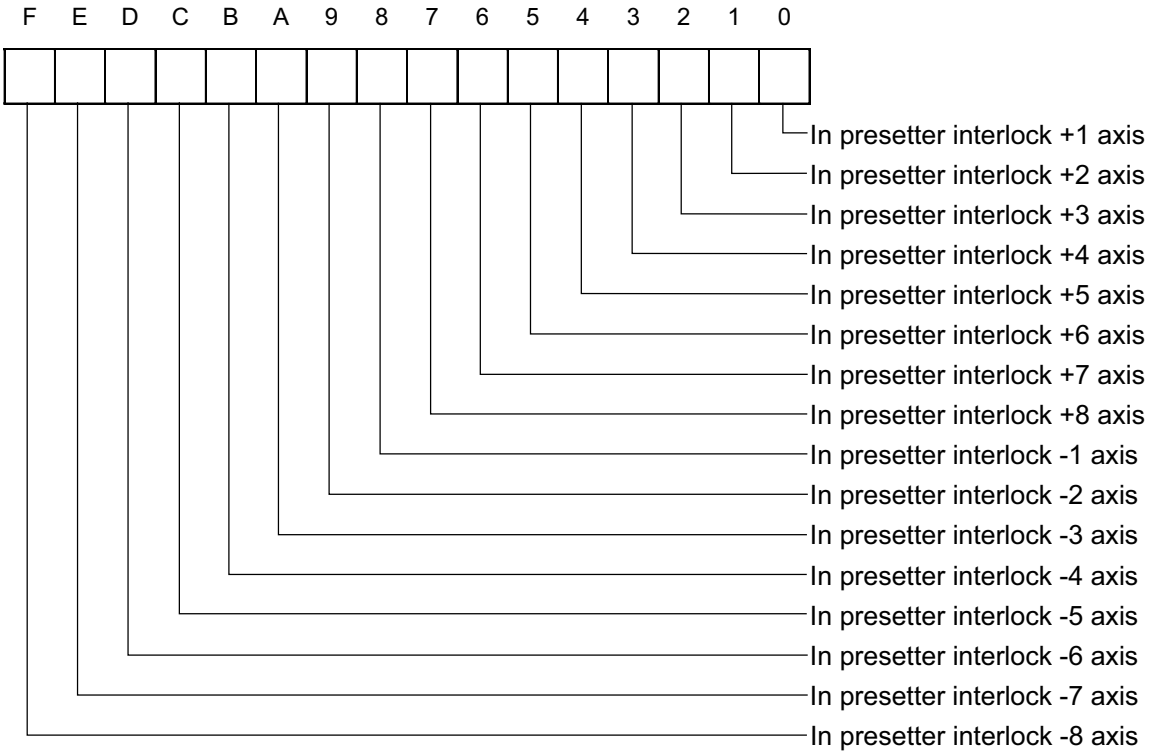
[Operation]

The interlock direction to the entrance direction in the CNC is output after the sensor is entered during the tool measurement mode (TLMS ON).

This signal is turned OFF when the escape operation completion conditions are satisfied.

This signal turns OFF when the "Tool measurement mode" signal is turned OFF.

This signal is not output when the tool measurement mode is not entered.


F E D C B A 9 8 7 6 5 4 3 2 1 0
In presetter interlock +1 axis
In presetter interlock +2 axis
In presetter interlock +3 axis
In presetter interlock +4 axis
In presetter interlock +5 axis
In presetter interlock +6 axis
In presetter interlock +7 axis
In presetter interlock +8 axis
In presetter interlock -1 axis
In presetter interlock -2 axis
In presetter interlock -3 axis
In presetter interlock -4 axis
In presetter interlock -5 axis
In presetter interlock -6 axis
In presetter interlock -7 axis
In presetter interlock -8 axis

1:In interlock

0:Interlock cancel or tool measurement mode OFF

[Related signals]

(1) Tool length measurement 2 (TLMS:YC21)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : STATUS OUTPUT (1) to (10)		R596 to 605	R796 to 805	R996 to 1005	R1196 to 1205	R1396 to 1405	R1596 to 1605	R1796 to 1805	R1996 to 2005

[Function]

The status of teaching and monitor execution for the load monitor, and the previous status is output. (In the case of 1st part system)

R596		R597		R598		R599		R600	
Low-order	High-order	Low-order	High-order	Low-order	High-order	Low-order	High-order	Low-order	High-order
Current	Previous	Two times prior	Three times prior	Four times prior	Five times prior	Six times prior	Seven times prior	Eight times prior	Nine times prior

R601		R602		R603		R604		R605	
Low-order	High-order	Low-order	High-order	Low-order	High-order	Low-order	High-order	Low-order	High-order
Ten times prior	Eleven times prior	Twelve times prior	Thirteen times prior	Fourteen times prior	Fifteen times prior	Sixteen times prior	Seventeen times prior	Eighteen times prior	Nineteen times prior

[Operation]

The following values are output according to each status.

Output value	Status	Details
0 (00)	Teaching/monitor not executed	
13(0D)	Teaching	In sampling prohibit time
14(0E)		In no-load monitor time
15(0F)		Waiting for cutting start point detection
16(10)		Waiting for cutting start point detection after interruption
17(11)		In monitoring prohibit time
18(12)		Monitoring prohibit time end
19(13)		Monitoring prohibit time end after interruption
23(17)	Monitoring (adaptive control invalid)	In sampling prohibit time
24(18)		Waiting for cutting start point detection
25(19)		In monitoring prohibit time
26(1A)		In monitoring prohibit time after interruption
27(1B)		Monitoring prohibit time end
28(1C)		Monitoring prohibit time end after interruption
33(21)	Monitoring (adaptive control valid)	In sampling prohibit time
34(22)		Waiting for cutting start point detection
35(23)		In monitoring prohibit time
36(24)		In monitoring prohibit time after interruption
37(25)		Monitoring prohibit time end
38(26)		Monitoring prohibit time end after interruption

(Note 1) The values shown in parentheses in the Output value field are hexadecimal notations.

(Note 2) "Interruption" refers to when teaching/monitoring is interrupted for rapid traverse during teaching/monitoring.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)

(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)

(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC3 to YCC7)

(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NO. OF WORK MACHINING (current value)		R606,7	R806,7	R1006,7	R1206,7	R1406,7	R1606,7	R1806,7	R2006,7
A	NO. OF WORK MACHINING (maximum value)		R608,9	R808,9	R1008,9	R1208,9	R1408,9	R1608,9	R1808,9	R2008,9

[Function]

The No. of work machining current value and maximum value are notified by the controller to the PLC.

[Operation]

If data is set in the No. of work machining (WRK COUNT M) and work machining maximum value (WRK LIMIT) of the [Process parameters], the current value or maximum value of the No. of work machining is output.

(For 1st part system)

R606	No. of work machining	Low-order side
R607	Current value	High-order side

R608	No. of work machining	Low-order side
R609	Maximum value	High-order side

(Note 1) If data is not set in "WRK COUNT M" and "WRK LIMIT" on the [Process Parameter] screen, data will not be output to the file register.

(Note 2) If the No. of work machining matches or exceeds maximum value, the No. of work machining over signal (XCA6) turns ON.

<Counting of No. of work machining using user PLC>

(1) Set "0" in "WRK COUNT M" on the [Process Parameter] screen. With this setting, the controller side will not count up.

(2) Add "1" to R606, 7 with the user PLC

(3) The controller will display R606, 7 as the No. of work machining on the [COORDINATE] screen. Even in this case, if the No. of work machining matches or exceeds the work maximum value, the No. of work machining over signal (XCA6) will turn ON.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SUB PART SYSTEM CONTROL: SUB PART SYSTEM CONTROL II IDENTIFICATION NO.	SBSID	R616	R816	R1016	R1216	R1416	R1616	R1816	R2016

[Function]

This signal indicates the identification numbers of sub part systems.

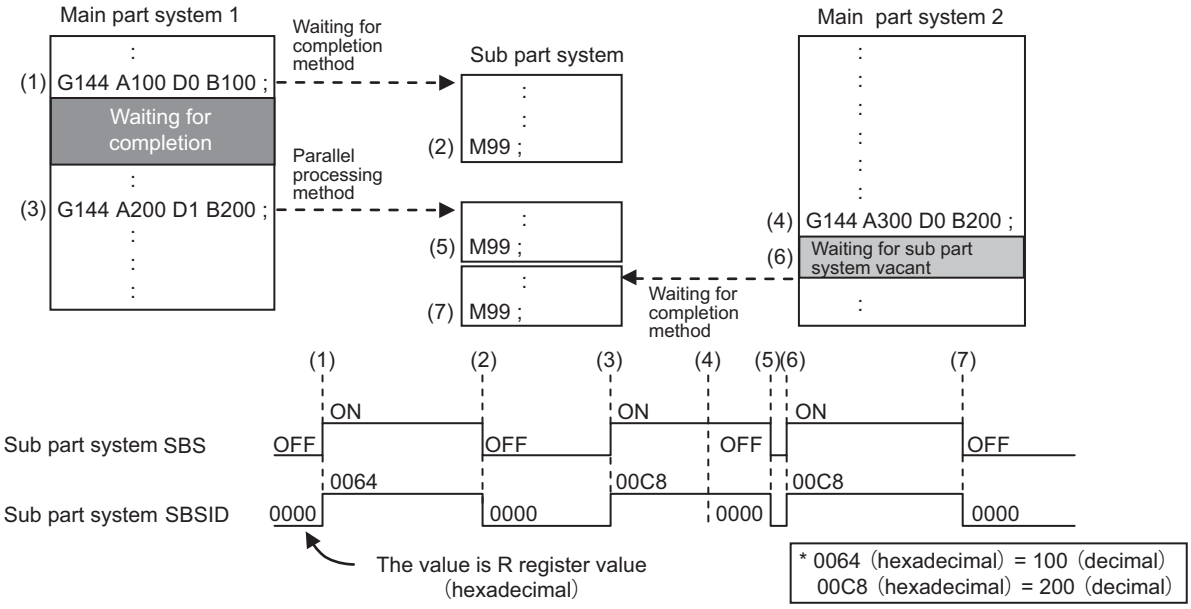
Refer to this signal if it is necessary to identify the G144 command that is controlling the sub part system.

[Operation]

A sub part system under the sub part system control II outputs the sub part system identification number while the "Sub part system control: Sub part system processing" signal (SBS) is ON.

The value is "0" when sub part system processing is not performed.

PLC input signal	Part system that outputs signals	Output signal value
Sub part system control: Sub part system processing (SBS:XC4E)	Sub part system	1: ON / 0: OFF
Sub part system control: Sub part system control II identification No. (SBSID: R616)	Sub part system	Sub part system identification No.


Main part system 1
Waiting for completion method
Sub part system
Main part system 2
(1) G144 A100 D0 B100 ;
Waiting for completion
(2) M99 ;
Parallel processing method
(3) G144 A200 D1 B200 ;
(5) M99 ;
(7) M99 ;
(4) G144 A300 D0 B200 ;
(6) Waiting for sub part system vacant
Waiting for completion method
(1) (2) (3) (4) (5)(6) (7)
Sub part system SBS
ON OFF ON OFF ON OFF
Sub part system SBSID
0064 0000 00C8 0000 00C8 0000
The value is R register value (hexadecimal)
* 0064 (hexadecimal) = 100 (decimal)
00C8 (hexadecimal) = 200 (decimal)

[Related signals]

(1) Sub part system control: Sub part system processing (SBS:XC4E)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SUB PART SYSTEM CONTROL: CALLING SUB PART SYSTEM	SBSCL	R617	R817	R1017	R1217	R1417	R1617	R1817	R2017

[Function]

This signal indicates the system bit data of a part system which is started as a sub part system.

To divide the PLC processing of the calling part system based on the sub part system, use this signal to find out which number of the sub part system is started.

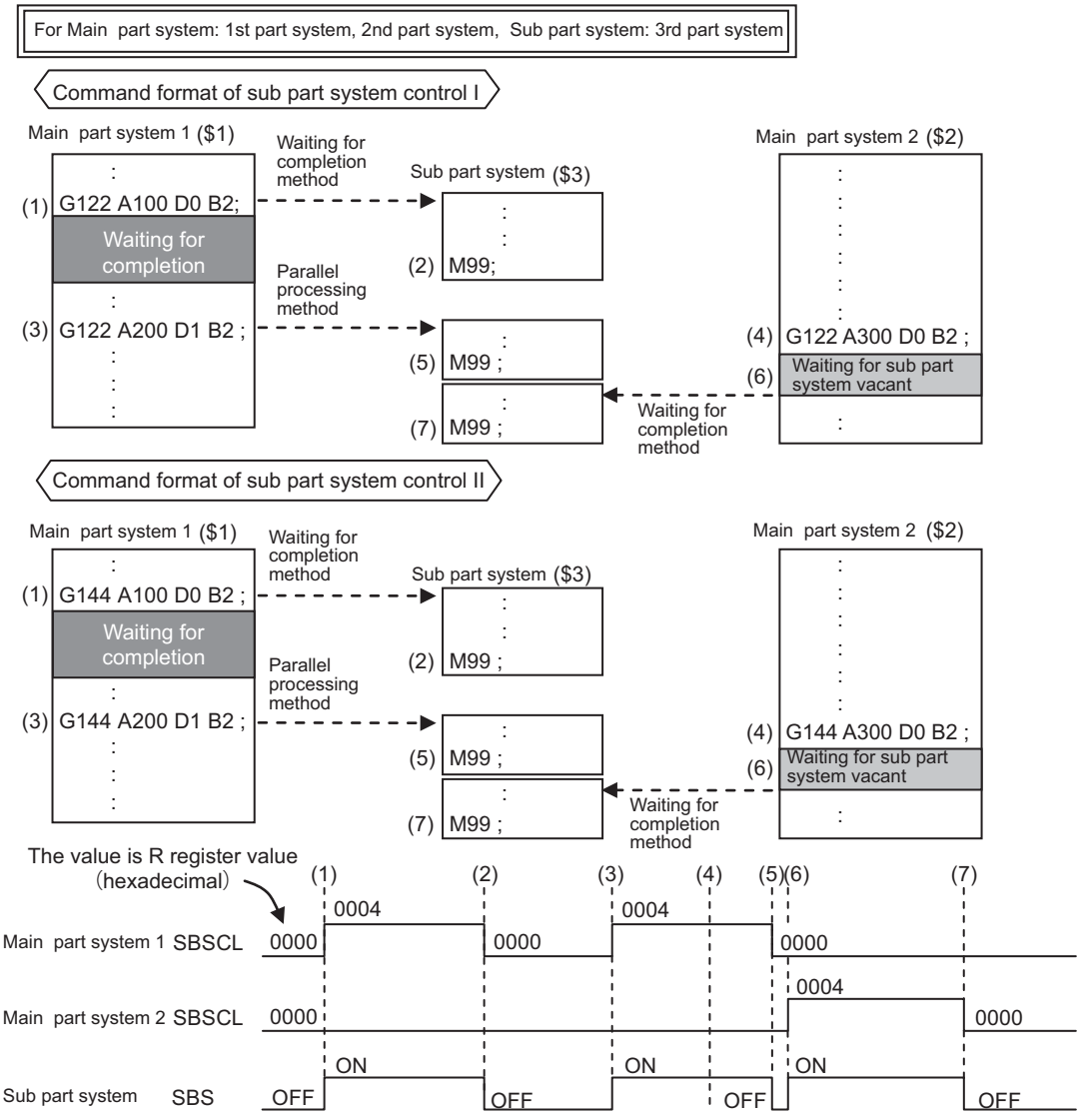
[Operation]

The system bit of the sub part system is ON at the calling part system while the "Sub part system control: Sub part system processing" signal (SBS) is ON.

The value is "0" when sub part system processing is not performed.

BITF	BITE	BITD	BITC	BITB	BITA	BIT9	BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Not used								$8	$7	$6	$5	$4	$3	$2	$1

PLC input signal	Part system that outputs signals	Output signal value
Sub part system control: Sub part system processing (SBS:XC4E)	Sub part system	1: ON / 0: OFF
Sub part system control: Calling sub part system (SBSCL:R617)	Calling part system	System bit of sub part system


For Main part system: 1st part system, 2nd part system, Sub part system: 3rd part system
Command format of sub part system control I
Main part system 1 ($1)
Waiting for completion method
Sub part system ($3)
Main part system 2 ($2)
(1) G122 A100 D0 B2;
Waiting for completion
(2) M99;
Parallel processing method
(3) G122 A200 D1 B2 ;
(4) G122 A300 D0 B2 ;
(5) M99 ;
(6) Waiting for sub part system vacant
(7) M99 ;
Waiting for completion method
Command format of sub part system control II
(1) G144 A100 D0 B2 ;
(2) M99 ;
(3) G144 A200 D1 B2 ;
(4) G144 A300 D0 B2 ;
(5) M99 ;
(6) Waiting for sub part system vacant
(7) M99 ;
Waiting for completion method
The value is R register value (hexadecimal)
Main part system 1 SBSCL
Main part system 2 SBSCL
Sub part system SBS
0000
0004
ON
OFF

[Related signals]

(1) Sub part system control: Sub part system processing (SBS:XC4E)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SUB PART SYSTEM CONTROL: WAITING FOR SUB PART SYSTEM COMPLETION	SBSWT	R618	R818	R1018	R1218	R1418	R1618	R1818	R2018

[Function]

This signal indicates which part system's completion the calling part system is waiting for.

To divide the PLC processing of the calling part system based on the starting method of the sub part system, use this signal to distinguish between the completion waiting method performed with this signal and the parallel processing method.

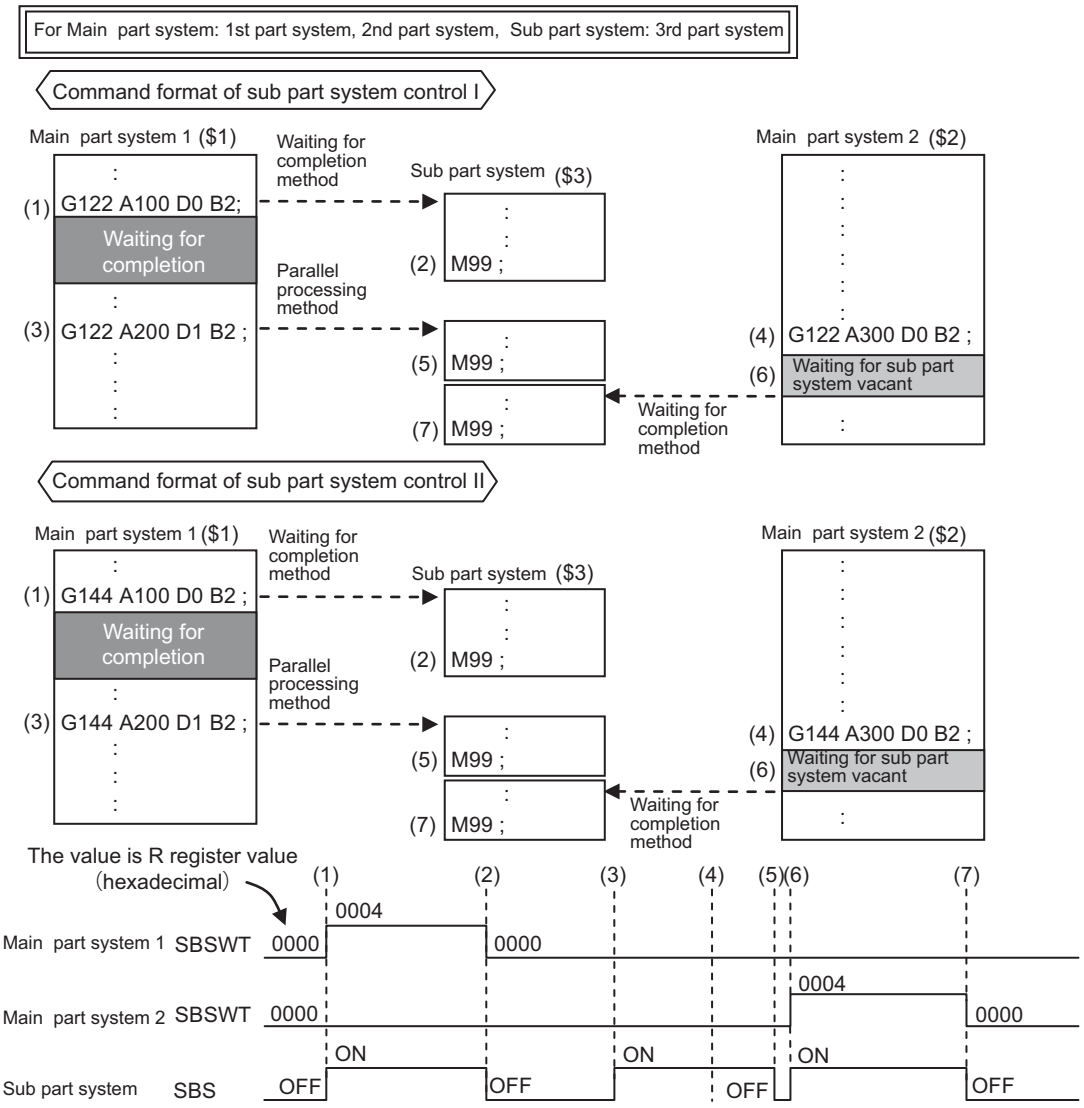
[Operation]

If a sub part system is started with the completion waiting method, the system bit of the sub part system whose completion is waited remains ON at the calling part system while the "Sub part system control: Sub part system processing" signal (SBS) is ON.

The value is "0" when sub part system processing is not performed.

BITF	BITE	BITD	BITC	BITB	BITA	BIT9	BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Not used								$8	$7	$6	$5	$4	$3	$2	$1

PLC input signal	Part system that outputs signals	Output signal value
Sub part system control: Sub part system processing (SBS:XC4E)	Sub part system	1: ON / 0: OFF
Sub part system control: Waiting for sub part system completion (SBSWT:R618)	Calling part system	System bit of sub part system


For Main part system: 1st part system, 2nd part system, Sub part system: 3rd part system
Command format of sub part system control I
Main part system 1 ($1)
Waiting for completion method
Sub part system ($3)
Main part system 2 ($2)
(1) G122 A100 D0 B2;
Waiting for completion
(2) M99 ;
Parallel processing method
(3) G122 A200 D1 B2 ;
(4) G122 A300 D0 B2 ;
(5) M99 ;
(6) Waiting for sub part system vacant
(7) M99 ;
Waiting for completion method
Command format of sub part system control II
Main part system 1 ($1)
Waiting for completion method
Sub part system ($3)
Main part system 2 ($2)
(1) G144 A100 D0 B2 ;
Waiting for completion
(2) M99 ;
Parallel processing method
(3) G144 A200 D1 B2 ;
(4) G144 A300 D0 B2 ;
(5) M99 ;
(6) Waiting for sub part system vacant
(7) M99 ;
Waiting for completion method
The value is R register value (hexadecimal)
(1) (2) (3) (4) (5)(6) (7)
0004
Main part system 1 SBSWT 0000 0000
0004
Main part system 2 SBSWT 0000 0000
ON ON ON
Sub part system SBS OFF OFF OFF OFF

[Related signals]

(1) Sub part system control: Sub part system processing (SBS:XC4E)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SUB PART SYSTEM CONTROL: CALLER OF SUB PART SYSTEM	SBSSY	R619	R819	R1019	R1219	R1419	R1619	R1819	R2019

[Function]

This signal indicates the part system that called the sub part system.

To divide the PLC processing of the sub part system based on the calling part system, use this signal to find out which part system (number) called the sub part system.

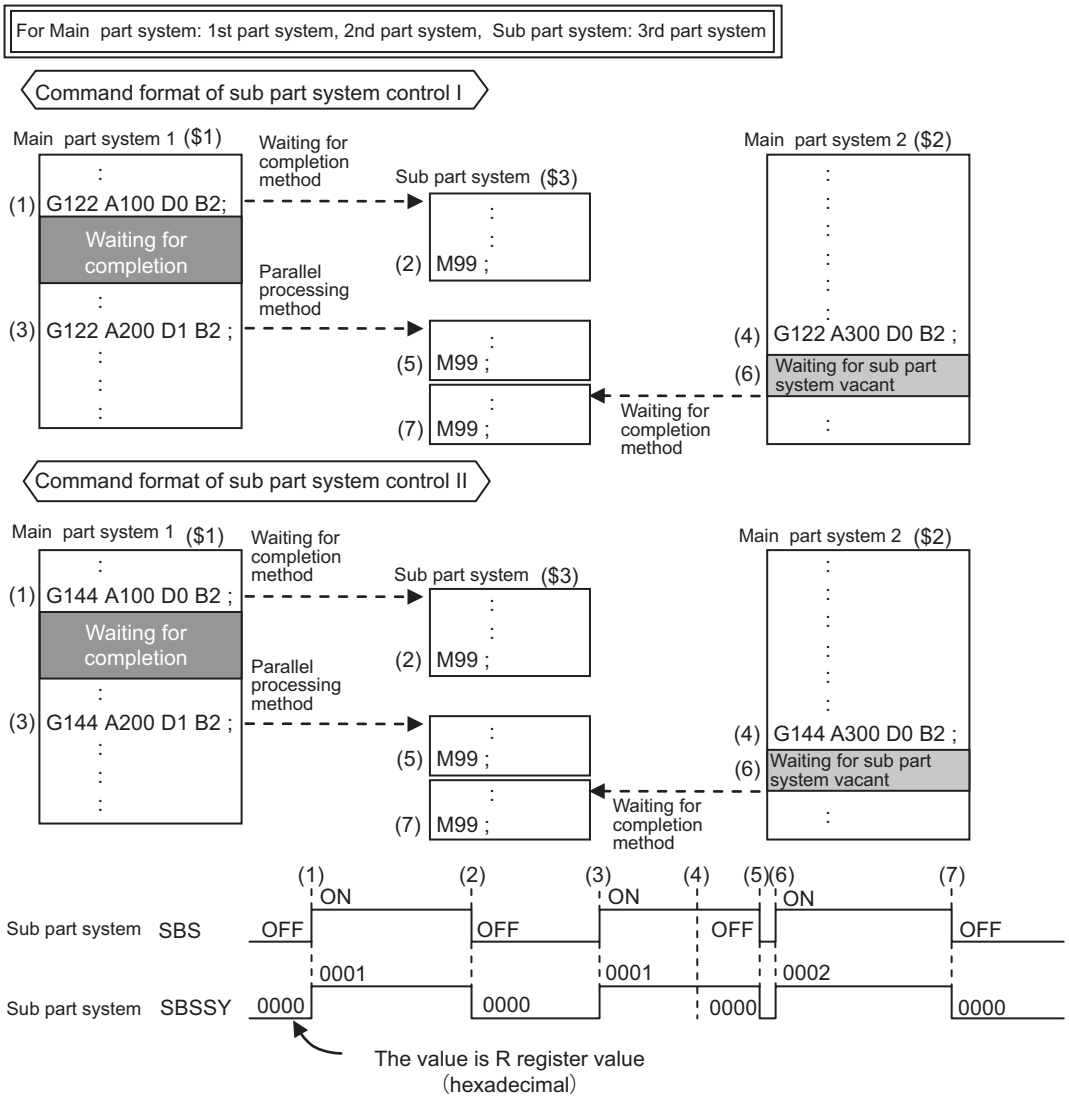
[Operation]

The system bit of the calling part system remains ON at the sub part system while the "Sub part system control: Sub part system processing" signal (SBS) is ON.

The value is "0" when sub part system processing is not performed.

BITF	BITE	BITD	BITC	BITB	BITA	BIT9	BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Not used								$8	$7	$6	$5	$4	$3	$2	$1

PLC input signal	Part system that outputs signals	Output signal value
Sub part system control: Sub part system processing (SBS:XC4E)	Sub part system	1: ON / 0: OFF
Sub part system control: Caller of sub part system (SBSSY:R619)	Sub part system	System bit of calling part system


For Main part system: 1st part system, 2nd part system, Sub part system: 3rd part system
Command format of sub part system control I
Main part system 1 ($1)
Waiting for completion method
Sub part system ($3)
Main part system 2 ($2)
(1) G122 A100 D0 B2;
Waiting for completion
(2) M99 ;
Parallel processing method
(3) G122 A200 D1 B2 ;
(4) G122 A300 D0 B2 ;
(5) M99 ;
(6) Waiting for sub part system vacant
(7) M99 ;
Waiting for completion method
Command format of sub part system control II
Main part system 1 ($1)
Waiting for completion method
Sub part system ($3)
Main part system 2 ($2)
(1) G144 A100 D0 B2 ;
Waiting for completion
(2) M99 ;
Parallel processing method
(3) G144 A200 D1 B2 ;
(4) G144 A300 D0 B2 ;
(5) M99 ;
(6) Waiting for sub part system vacant
(7) M99 ;
Waiting for completion method
(1) (2) (3) (4) (5)(6) (7)
Sub part system SBS
ON OFF ON OFF ON OFF
Sub part system SBSSY
0001 0000 0001 0000 0002 0000
The value is R register value
(hexadecimal)

[Related signals]

(1) Sub part system control: Sub part system processing (SBS:XC4E)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CONSTANT TORQUE CONTROL: AXIS UNDER CONSTANT TORQUE/ PROPORTIONAL TORQUE STOPPER CONTROL		R624	R824	R1024	R1224	R1424	R1624	R1824	R2024

[Function]

With bit data, this signal indicates which axis is under constant torque control or proportional torque stopper control.

BIT	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Axis	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
	Axis in proportional torque stopper control								Axis in constant torque control							

(Note) The axis bit configuration for part systems are the same as the basic axis configuration.

[Operation]

(1) High-order 8 bits: Axis in proportional torque stopper control

The axis bit corresponding to the axis to which proportional torque stopper control is commanded with the "Proportional torque stopper control request axis" signal (R2620/high-order 8 bits) turns ON.

The axis bit corresponding to the axis for which proportional torque stopper control is canceled with the "Proportional torque stopper control request axis" signal turns OFF.

(2) Low-order 8 bits: Axis in torque constant control

The axis bit corresponding the axis to which constant torque control is commanded with the "Constant torque control request axis" signal (R2620/low-order 8 bits) turns ON.

The axis bit corresponding the axis for which constant torque control is canceled with the "Constant torque control request axis" signal turns OFF.

[Related signals]

(1) Constant torque control: Constant torque/proportional torque stopper control request axis (R2620)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CONSTANT TORQUE CONTROL: CONSTANT TORQUE DROOP CAN-CEL AXIS STATUS		R625	R825	R1025	R1225	R1425	R1625	R1825	R2025

[Function]

With bit data, this signal indicates the axis for which constant torque droop cancellation is being executed or the axis for which constant torque droop cancellation is completed.

BIT	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Axis	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
	Axis for which constant torque droop cancellation is completed								Axis for which constant torque droop cancellation is being executed							

(Note) The axis bit configuration for part systems are the same as the basic axis configuration.

[Operation]

(1) High-order 8 bits: Axis for which constant torque droop cancellation is completed

The axis bit corresponding to the axis for which droop cancellation commanded with the "Constant torque droop cancel request axis" signal (R2621/high-order 8 bits) is completed turns ON.

When the axis bit of the "Constant torque droop cancel request axis" signal turns OFF, the corresponding axis bit of this signal turns OFF.

(2) Lower-order 8 bits: Axis for which constant torque droop cancellation is being executed

The axis bit corresponding to the axis for which droop cancellation commanded with the "Constant torque droop cancel request axis" signal (R2621/low-order 8 bits) is being executed turns ON.

When the axis bit of the "Constant torque droop cancel request axis" signal turns OFF, the corresponding axis bit of this signal turns OFF.

[Related signals]

(1) Constant torque control: Constant torque droop cancel request axis (R2621)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LIFE USAGE DATA		R628,9	R828,9	R1028,9	R1228,9	R1428,9	R1628,9	R1828,9	R2028,9

[Function][Operation]

This signal output usage data of tools currently being used with the tool life management II. (When multiple compensation Nos. are used, the total usage data per compensation No. is output.)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NUMBER OF REGISTERED TOOL LIFE CONTROL TOOLS		R630	R830	R1030	R1230	R1430	R1630	R1830	R2030

[Function] [Operation]

This signal indicates number of tools currently in life management.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
	CIRCULAR FEED IN MANUAL MODE CURRENT POSITION X		R636,7	R836,7	R1036,7	R1236,7	R1436,7	R1636,7	R1836,7	R2036,7
A	CIRCULAR FEED IN MANUAL MODE CURRENT POSITION Y		R640,1	R840,1	R1040,1	R1240,1	R1440,1	R1640,1	R1840,1	R2040,1

[Function]

The current positions of X' and Y' axes on the hypothetical coordinate are set when the circular feed in manual mode is valid.

[Operation]

The current positions of X' and Y' axes on the hypothetical coordinate are set while the "Circular feed in manual mode valid" signal is ON.

In the "circular-linear" mode, the current position of X' on the hypothetical coordinate is set by the angle (0.000° to 360.000°) from the basic point.

The hypothetical coordinate value to be set is in the following state.

"Linear-linear" hypothetical coordinate	Y' axis: mirror image is not valid
"Circular-linear" hypothetical coordinate	X' axis: "+" indicates the inverse (CW) direction Y' axis: mirror image is not valid

[Caution]

(1) This data is valid only when the "Circular feed in manual mode being valid" signal is ON. If the signal is OFF, the current position data is uncertain (the value is not ensured).

(2) The current positions are output with "0.5*PLC setting unit".

(3) When "1" is set to the parameter "#1040 M_inch", this data is output by inch.

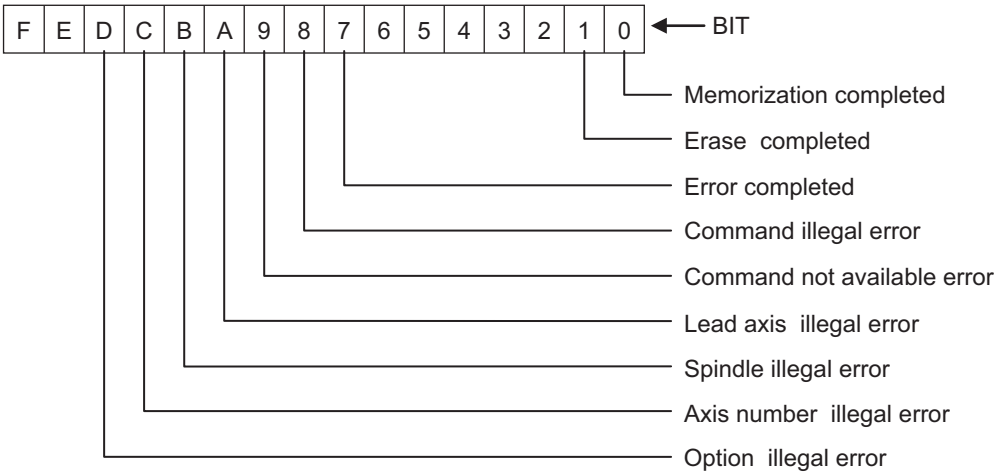
[Related signals]

(1) In circular feed in manual mode (XC4F)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	THREAD RECUTTING STATUS		R648	R848	R1048	R1248	R1448	R1648	R1848	R2048

[Function]

This signal indicates the status of operation commanded with the "Thread recutting command" signal.
When the thread recutting operation from the ladder ("#1258 set30" /bit4 = "1") is selected, the NC inputs the status of thread recutting operation to this signal.
The status is not input when the thread recutting operation from the Mitsubishi HMI ("#1258 set30" /bit4 = "0") is selected.


F E D C B A 9 8 7 6 5 4 3 2 1 0
BIT
Memorization completed
Erase completed
Error completed
Command illegal error
Command not available error
Lead axis illegal error
Spindle illegal error
Axis number illegal error
Option illegal error

[Operation]

BIT0 [memory completed]:
This bit turns ON after the "memory" operation commanded with the "Thread recutting command" (R2626) signal is normally completed.

BIT1 [erase completed]:
This bit turns ON after the "erase" operation commanded with the "Thread recutting command" (R2626) signal is normally completed.

BIT7 [error completed]:
This bit turns ON when the "memory" or "erase" operation commanded with the "Thread recutting command" (R2626) signal is not normally completed.

BIT8 [command illegal error]:
This bit turns ON when operation was executed while both "memory" and "erase" of the "Thread recutting command" (R2626) signal are OFF or ON.

BIT9 [command unavailable error]:
This bit turns ON when conditions are not met to execute "memory" or "erase" operation commanded with the "Thread recutting command" (R2626) signal.

BITA [lead axis illegal error]:
This bit turns ON if the lead axis coordinates is not established when the "memory" operation is commanded with the "Thread recutting command" (R2626) signal.

BITA [spindle illegal error]:
This bit turns ON if the spindle has not rotated at least one revolution after power ON when "memory" operation is commanded with the "Thread recutting command" (R2626) signal.

BITC [axis number illegal error]:
This bit turns ON if the lead axis number or spindle number is "0" or larger than the number of connected axes when the "memory" operation is commanded with the "Thread recutting command" (R2626) signal.

BITD [Option illegal error]:
This bit turns ON if thread recutting option is disabled when the "memory" or "erase" operation is commanded with the "Thread recutting command" (R2626) signal.

(1) This signal turns ON only when the "Thread recutting command" (R2626) BIT7 (command execution) signal is ON.
(2) All bits of this signal turn OFF at the falling edge of the "Thread recutting command" (R2626) BIT7 (command execution) signal.
(3) This signal turns OFF only at the falling edge of the "Thread recutting command" (R2626) BIT7 (command execution) signal. Other signals such as a resetting signal cannot be used to turn this signal OFF.

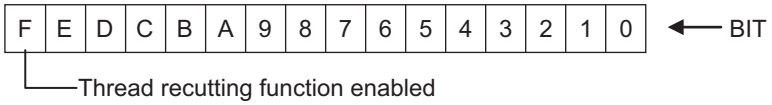
[Related signals]

(1) Thread recutting command (R2626)
(2) Thread recutting spindle No. (R650)
(3) Thread recutting lead axis No. (R651)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	THREAD RECUTTING EXECUTION STATUS		R649	R849	R1049	R1249	R1449	R1649	R1849	R2049

[Function]

This signal indicates whether thread recutting can be executed or not.
When the thread recutting operation from the ladder ("#1258 set30" /bit4 = "1") is selected, the NC inputs the status of thread recutting operation to this signal.
The status is not input when the thread recutting operation from the Mitsubishi HMI ("#1258 set30" /bit4 = "0") is selected.



[Operation]

BITF [Thread recutting function enabled]:
Thread recutting is performed if you execute thread cutting while this bit is ON.
This bit turns ON when BITF of the "Thread recutting execution operation" (R2627) signal is input and the data required to execute thread recutting is stored in the memory.

[Related signals]

(1) Thread recutting execution operation (R2627)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	THREAD RECUTTING SPINDLE NO.		R650	R850	R1050	R1250	R1450	R1650	R1850	R2050

[Function][Operation]

With binary data, this signal outputs the spindle number for which the position within one spindle revolution is memorized.

0 : Not memorized
1 : 1st spindle / 1st axis
2 : 2nd spindle / 2nd axis
3 : 3rd spindle / 3rd axis
:
(up to the number of connected axes)

When the thread recutting operation from the ladder ("#1258 set30" /bit4 = "1") is selected, the NC inputs the status of thread recutting operation to this signal.
The status is not input when the thread recutting operation from the Mitsubishi HMI ("#1258 set30" /bit4 = "0") is selected.

[Related signals]

(1) Encoder selection (R2567)
(2) Thread recutting command (R2626)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	THREAD RECUTTING LEAD AXIS NO.		R651	R851	R1051	R1251	R1451	R1651	R1851	R2051

[Function][Operation]

With binary data, this signal outputs the lead axis number for which the lead axis coordinates is memorized.

0 : Not memorized
1 : 1st spindle / 1st axis
2 : 2nd spindle / 2nd axis
3 : 3rd spindle / 3rd axis
:
(up to the number of connected axes)

When the thread recutting operation from the ladder ("#1258 set30" /bit4 = "1") is selected, the NC inputs the status of thread recutting operation to this signal.
The status is not input when the thread recutting operation from the Mitsubishi HMI ("#1258 set30" /bit4 = "0") is selected.

[Related signals]

(1) Encoder selection (R2567)
(2) Thread recutting command (R2626)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	R-NAVI: SELECTED WORKPIECE NO.	RSWRK	R660	R860	R1060	R1260	R1460	R1660	R1860	R2060

[Function]

These signals notify the workpiece No. of the machining surface being selected by the R-Navi function.

[Operation]

These signals are set when:
(1) A machining surface is selected on [Surface Selection] of the Monitor screen.
These signals are cleared when:
(1) The machining surface is cancelled.
(2) Emergency stop is input.
(Note) These signals will not be set while a machining surface is being called by a program.

[Related signals]

(1) R-Navi: machining surface being selected (RSSCT:XD28)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	R-NAVI: SELECTED MACHINING SURFACE NO.	RSSRF	R661	R861	R1061	R1261	R1461	R1661	R1861	R2061

[Function]

These signals notify the surface No. of the machining surface being selected by the R-Navi function.

[Operation]

These signals are set when:
(1) A machining surface is selected on [Surface Selection] of the Monitor screen.
These signals are cleared when:
(1) The machining surface is cancelled.
(2) Emergency stop is input.
(Note) These signals will not be set while a machining surface is being called by a program.

[Related signals]

(1) R-Navi: machining surface being selected (RSSCT:XD28)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	3D MACHINE INTERFERENCE CHECK : REQUESTED SHAPE GROUP NO. 1 to 4		R2400 to 3

[Function]

This signal outputs the No. of shape group which has been selected as the target of 3D machine interference check through the [Shape Select] screen.

[Operation]

This signal is updated when the target shape group is changed through the [Shape Select] screen.

Change of the Requested shape group No. does not affect the interference check.

To reflect the Requested shape group No. in the interference check, update the 3D Machine Interference Check : Enabled shape group No.

(Note 1) Shapes defined in Group 1 are within the scope of the interference check, but those of Groups 2 to 4 are outsidethat scope.

[Related signals]

(1) 3D Machine Interference Check : Enabled shape group No. (R4400)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	MACHINE POSITION n-TH AXIS		R4500,1 to R4528,9	R4532,3 to R4560,1	R4564,5 to R4592,3	R4596,7 to R4624,5

[Function]

This signal outputs the position (n-th axis) on the machine coordinate system by the PLC setting unit.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	FEEDBACK MACHINE POSITION n-TH AXIS		R4628,9 to R4656,7	R4660,1 to R4688,9	R4692,3 to R4720,1	R4724,5 to R4552,3

[Function]

This signal outputs motor feedback position (n-th axis) on the machine coordinate system by the PLC setting unit.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	SERVO DEFLECTION AMOUNT n-TH AXIS		R4756 to 71	R4772 to 87	R4788 to 803	R4804 to 19

[Function]

The deflection amount of the servo n-th axis is output always in the command unit.

[Operation]

Servo 1st part system 1st axis: R4756 (LOW) R4757 (HIGH)

:

Servo 1st part system 8th axis: R4770 (LOW) R4771 (HIGH)

Servo 2nd part system 1st axis: R4772 (LOW) R4773 (HIGH)

:

Servo 2nd part system 8th axis: R4786 (LOW) R4787 (HIGH)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	MOTOR ROTATION SPEED n-TH AXIS		R4820,1 to R4834,5	R4836,7 to R4850,1	R4852,3 to R4866,7	R4868,9 to R4882,3

[Function]

This signal outputs motor rotation speed (n-th axis) with r/min.

[Operation]

The motor rotation speed is assigned as below.

Signal name	File register			
	$1	$2	$3	$4
Motor rotation speed 1st axis	R4820,1	R4836,7	R4852,3	R4868,9
Motor rotation speed 2nd axis	R4822,3	R4838,9	R4854,5	R4870,1
Motor rotation speed 3rd axis	R4824,5	R4840,1	R4856,7	R4872,3
Motor rotation speed 4th axis	R4826,7	R4842,3	R4858,9	R4874,5
Motor rotation speed 5th axis	R4828,9	R4844,5	R4860,1	R4876,7
Motor rotation speed 6th axis	R4830,1	R4846,7	R4862,3	R4878,9
Motor rotation speed 7th axis	R4832,3	R4848,9	R4864,5	R4880,1
Motor rotation speed 8th axis	R4834,5	R4850,1	R4866,7	R4882,3

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	MOTOR LOAD CURRENT n-TH AXIS		R4884,5 to R4898,9	R4900,1 to R4914,5	R4916,7 to R4930,1	R4932,3 to R4946,7

[Function]

This signal outputs motor load current (n-th axis) with continuous current (%) during stalling.

[Operation]

The motor load current is assigned as below.

Signal name	File register			
	$1	$2	$3	$4
Motor load current 1st axis	R4884,5	R4900,1	R4916,7	R4932,3
Motor load current 2nd axis	R4886,7	R4902,3	R4918,9	R4934,5
Motor load current 3rd axis	R4888,9	R4904,5	R4920,1	R4936,7
Motor load current 4th axis	R4890,1	R4906,7	R4922,3	R4938,9
Motor load current 5th axis	R4892,3	R4908,9	R4924,5	R4940,1
Motor load current 6th axis	R4894,5	R4910,1	R4926,7	R4942,3
Motor load current 7th axis	R4896,7	R4912,3	R4928,9	R4944,5
Motor load current 8th axis	R4898,9	R4914,5	R4930,1	R4946,7

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	SKIP COORDINATE POSITION n-TH AXIS		R4948,9 to R4976,7	R4980,1 to R5008,9	R5012,3 to R5040,1	R5044,5 to R5072,3

[Function]

This signal outputs skip coordinate position Y (n-th axis) with PLC setting unit.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	SYNCHRONOUS ERROR AMOUNT n-TH AXIS		R5076,7 to R5090,1	R5092,3 to R5106,7	R5108,9 to R5122,3	R5124,5 to R5138,9

[Function]

The synchronization error amount during the synchronous control is output. (Unit: command unit)

[Operation]

The synchronization error amount between the reference axis and synchronized axis during the synchronous control is output to the synchronized axis.

(The axis Nos. are not for each part system, but for the entire system.)

Synchronization error amount	R register	Synchronization error amount	R register
1st axis	R5076(L)/R5077(H)	17th axis	R5108(L)/R5109(H)
2nd axis	R5078(L)/R5079(H)	18th axis	R5110(L)/R5111(H)
3rd axis	R5080(L)/R5081(H)	19th axis	R5112(L)/R5113(H)
4th axis	R5082(L)/R5083(H)	20th axis	R5114(L)/R5115(H)
5th axis	R5084(L)/R5085(H)	21th axis	R5116(L)/R5117(H)
6th axis	R5086(L)/R5087(H)	22th axis	R5118(L)/R5119(H)
7th axis	R5088(L)/R5089(H)	23th axis	R5120(L)/R5121(H)
8th axis	R5090(L)/R5091(H)	24th axis	R5122(L)/R5123(H)
9th axis	R5092(L)/R5093(H)	25th axis	R5124(L)/R5125(H)
10th axis	R5094(L)/R5095(H)	26th axis	R5126(L)/R5127(H)
11th axis	R5096(L)/R5097(H)	27th axis	R5128(L)/R5129(H)
12th axis	R5098(L)/R5099(H)	28th axis	R5130(L)/R5131(H)
13th axis	R5100(L)/R5101(H)	29th axis	R5132(L)/R5133(H)
14th axis	R5102(L)/R5103(H)	30th axis	R5134(L)/R5135(H)
15th axis	R5104(L)/R5105(H)	31th axis	R5136(L)/R5137(H)
16th axis	R5106(L)/R5107(H)	32th axis	R5138(L)/R5139(H)

[Related signals]

(1) Synchronous control request (SYNC1 to 8: YA80 to 7)

(2) Superimposition control request (PILE1 to 8: YAA0 to 7)

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	SERVO ALARM/WARNING NO.		R5332 to R5339	R5340 to R5347	R5348 to R5355	R5356 to R5363

[Function]

This signal indicates the alarm No./warning No. of servo drive unit. (hexadecimal 2 digits)

This signal sets the 4-digit alarm No. which is displayed on the NC screen.

[Operation]

This signal is set up when the alarm/waring occurs in the servo drive unit.

This signal will be cleared when the alarm/warning is canceled.

This signal is not set if the servo warning "S52 Control axis detach warning 00E6" or "S52 In NC emergency stop state 00E7" occurs.

If more than one alarm/warning occurs, the value displayed in the [LED display] of [Drive motor]-[Servo unit] screen is set.

[Related signals]

(1) NC warning (servo warning) (XC9C)

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	SKIP COORDINATE POSITION N-TH AXIS FEATURE CO-ORDINATE		R5364,5 to R5392,3	R5396,7 to R5424,5	R5428,9 to R5456,7	R5460,1 to R5488,9

[Function]

This signal outputs skip coordinate position (n-th axis) by the PLC setting unit.

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	LOAD MONITOR I : CUTTING TORQUE OUTPUT VALUE N-TH AXIS		R5492 to R5499	R5500 to R5507	R5508 to R5515	R5516 to R5523

[Function]

The cutting torque of servo axis is output to these devices.

[Operation]

Cutting torque (estimated disturbance torque) is output to these devices.

Output unit: Stall current %

”0x64” is output when the cutting torque reaches 100%.

When the cutting torque reaches -1%, ”0xffff” is output.

R5492 : Cutting torque output value 1st axis

R5493 : Cutting torque output value 2nd axis

R5494 : Cutting torque output value 3rd axis

R5495 : Cutting torque output value 4th axis

R5496 : Cutting torque output value 5th axis

R5497 : Cutting torque output value 6th axis

R5498 : Cutting torque output value 7th axis

R5499 : Cutting torque output value 8th axis

[Related signals]

(1) Load monitor I : Cutting torque estimation in progress (XCEE)

(2) Load monitor I : Cutting torque estimation completed (XCEF)

(3) Load monitor I : Cutting torque estimation execution (YCEF)

(4) Load monitor I : Spindle cutting torque output value (R6528)

(5) Load monitor I : Cutting torque estimation target axis (R22692)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4
A	Load monitor I: Effective torque output n-th axis		R5620 to R5627	R5628 to R5635	R5636 to R5643	R5644 to R5651

[Function]

The effective torque of the servo axis is output to these devices.

[Operation]

The effective torque of the servo axis is output to this signal.

R5620	Effective torque output 1st axis
R5621	Effective torque output 2nd axis
R5622	Effective torque output 3rd axis
R5623	Effective torque output 4th axis
R5624	Effective torque output 5th axis
R5625	Effective torque output 6th axis
R5626	Effective torque output 7th axis
R5627	Effective torque output 8th axis

[Related signals]

(1) Load monitor I : Axis selection (R2580)

(2) Load monitor I: Effective spindle torque output (R6542)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	USER MACRO OUTPUT #1132 (NC -> PLC)		R6372,3	R6380,1	R6388,9	R6396,7

[Function]

This is interface function used to coordinate user PLC to user macro.

[Operation]

When a value is set in the system variables #1100 to #1131 or #1132 with the user macro system, the user PLC output to the file register Rn and Rn+1 corresponding to the user PLC can be referred to with that value.

The relationship between system variable and file register is as follows:

System variable	Points	Interface output signal	System variable	Points	Interface output signal
#1100	1	Register R6372 bit 0	#1116	1	Register R6373 bit 0
#1101	1	Register R6372 bit 1	#1117	1	Register R6373 bit 1
#1102	1	Register R6372 bit 2	#1118	1	Register R6373 bit 2
#1103	1	Register R6372 bit 3	#1119	1	Register R6373 bit 3
#1104	1	Register R6372 bit 4	#1120	1	Register R6373 bit 4
#1105	1	Register R6372 bit 5	#1121	1	Register R6373 bit 5
#1106	1	Register R6372 bit 6	#1122	1	Register R6373 bit 6
#1107	1	Register R6372 bit 7	#1123	1	Register R6373 bit 7
#1108	1	Register R6372 bit 8	#1124	1	Register R6373 bit 8
#1109	1	Register R6372 bit 9	#1125	1	Register R6373 bit 9
#1110	1	Register R6372 bit 10	#1126	1	Register R6373 bit 10
#1111	1	Register R6372 bit 11	#1127	1	Register R6373 bit 11
#1112	1	Register R6372 bit 12	#1128	1	Register R6373 bit 12
#1113	1	Register R6372 bit 13	#1129	1	Register R6373 bit 13
#1114	1	Register R6372 bit 14	#1130	1	Register R6373 bit 14
#1115	1	Register R6372 bit 15	#1131	1	Register R6373 bit 15

System variable	Points	Interface output signal
#1132	32	Register R6372, R6373
#1133	32	Register R6374, R6375
#1134	32	Register R6376, R6377
#1135	32	Register R6378, R6379

This correspondence table shows the example for file registers R6372 and R6373.

File registers R6372 and R6373 correspond to system variables #1100 to #1131, and #1132 (32-bit data).

To use the R register of the 2nd and subsequent part system, set "1" to "#1230 set02/bit7".

[Related signals]

(1) User macro output #1133, #1134, #1135 (R6374/6375, R6376/6377, R6378/6379)

(2) User macro input #1032, #1033, #1034, #1035 (R6436/6437, R6438/6439, R6440/6441, R6442/66443)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	USER MACRO OUTPUT #1133 (NC -> PLC)		R6374,5	R6382,3	R6390,1	R6398,9

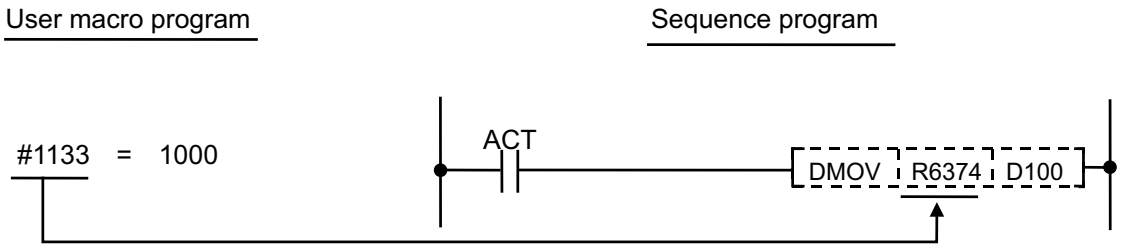
[Function]

This provides interface function used to coordinate user PLC to user macro.

[Operation]

When a value is set in the system variable #1133 with the user macro system, the user PLC output to the file register Rn and Rn+1 corresponding to the user PLC can be referred to with that value.

(Example)



1000 is input in D100 and 101 when the ACT signal turns ON.

[Related signals]

(1) User macro output #1132, #1134, #1135, #1100 to #1131 (R6372/6373, R6376/6377, R6378/6379)

(2) User macro input #1032, #1033, #1034, #1035, #1000 to #1031 (R6436/6437, R6438/6439, R6440/6441, R6442/66443)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	USER MACRO OUTPUT #1134 (NC -> PLC)		R6376,7	R6384,5	R6392,3	R6400,1

[Function][Operation]

The function operation, etc. are the same as those of "USER MACRO OUTPUT #1133".

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	USER MACRO OUTPUT #1135 (NC -> PLC)		R6378,9	R6386,7	R6394,5	R6402,3

[Function][Operation]

The function operation, etc. are the same as those of "USER MACRO OUTPUT #1133".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SPINDLE COMMAND ROTATION SPEED INPUT		R6500,1	R6550,1	R6600,1	R6650,1	R6700,1	R6750,1	R6800,1	R6850,1

[Function]

This signal informs that spindle speed reference signal (S) specified in automatic operation (memory, MDI or tape) or by manual numerical data input. "Spindle command rotation input" speed output from the controller is binary data. Under the S command mode, the data can be monitored in the "S display" on the command value screen.

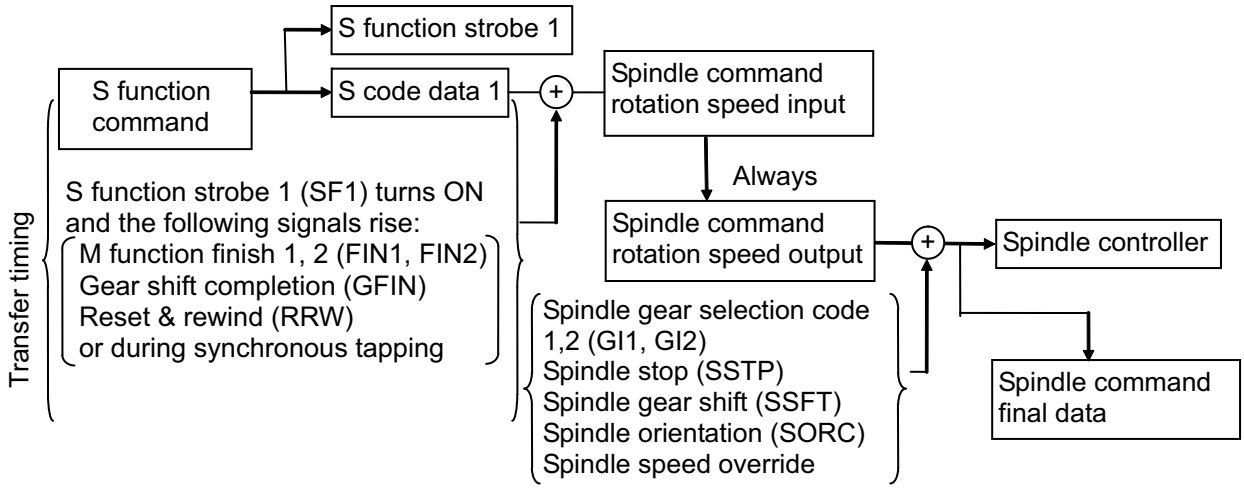
[Operation]

Set "Spindle command rotation speed input" is renewed when:

(1) "S**" is specified in automatic operation (memory, MDI or tape) and "M function finish 1 or 2" signal (FIN1 or FIN2) or "Gear shift completion" signal (GFIN) is sent back to the controller.

(2) "S**" is specified by manual numerical command input and "M function finish 1 or 2" signal (FIN1 or FIN2) or "Gear shift completion" signal (GFIN) is sent back to the controller.

(Note 1) Data cannot be cleared by "Reset" or "Emergency stop".


S function strobe 1
S function command
S code data 1
Spindle command rotation speed input
Always
Transfer timing
S function strobe 1 (SF1) turns ON and the following signals rise:
M function finish 1, 2 (FIN1, FIN2)
Gear shift completion (GFIN)
Reset & rewind (RRW)
or during synchronous tapping
Spindle command rotation speed output
Spindle controller
Spindle gear selection code 1,2 (GI1, GI2)
Spindle stop (SSTP)
Spindle gear shift (SSFT)
Spindle orientation (SORC)
Spindle speed override
Spindle command final data

When the system is under constant surface speed control, constant surface speed data is set for "Spindle command rotation speed input".

(Note 2) "Spindle command rotation speed input" directly denotes spindle speed (r/min) specified as S function command.

[Related signals]

(1) Spindle speed command rotation output (R7000, 1)

(2) Spindle command final data (R6502, 3)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE COMMAND FINAL DATA (rotation speed)		R6502,3	R6552,3	R6602,3	R6652,3	R6702,3	R6752,3	R6802,3	R6852,3

[Function]

The command value is indicated to the spindle controller.

[Operation]

The "Spindle command rotation speed input" indicates the value for the spindle function (S) data commanded with the automatic operation or manual numeric value command, whereas this data indicates a value to which the "Spindle override", "Spindle gear selection code 1,2" (GI1, GI2), "Spindle stop" (SSTP), "Spindle gear shift" (SSFT) and "Spindle orientation" (SORC) conditions have been considered.

[Related signals]

(1) Spindle command rotation speed input (R6500, 1)

(2) Spindle command rotation speed output (R7000, 1)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE ACTUAL SPEED		R6506,7	R6556,7	R6606,7	R6656,7	R6706,7	R6756,7	R6806,7	R6856,7

[Function]

When the system has spindle equipped with encoder, actual spindle speed can be monitored.

[Operation]

True spindle speed is always set by feedback signal from spindle encoder.

Data are multiplied by 1000, and stored.

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION PHASE ERROR/HOB AXIS DELAY ANGLE		R6516	R6566	R6616	R6666	R6716	R6766	R6816	R6866

[Function]

The synchronized spindle delay to the reference spindle is output in the spindle synchronized function.

The delay of the workpiece axis to the hob axis is output in the tool spindle synchronization II (Hobbing).

The 1st spindle signal is normally used.

(Note) This signal uses the 1st spindle signal regardless of the hob spindle's number.

[Operation]

The synchronized spindle delay to the reference spindle is output.

The delay of the workpiece axis to the hob axis is output in the tool spindle synchronization II (Hobbing).

Unit: 360° /4096

(Note 1) If the phase can not be calculated because, for instance, the reference spindle or synchronized spindle (hob axis or workpiece axis) has not passed the Z-phase, "-1" will be output.

(Note 2) This data is output only during the phase shift calculation or the spindle phase synchronization.

[Related signals]

(1) Phase shift calculation request (SSPHM:Y18B3)

(2) Phase offset request (SSPHF:Y18B4)

(3) Spindle synchronization phase offset data (R6518)

(4) Spindle synchronization Maximum phase error/Maximum hob axis delay angle (R6517)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION MAXI-MUM PHASE ERROR/MAXIMUM HOB AXIS DELAY ANGLE		R6517	R6567	R6617	R6667	R6717	R6767	R6817	R6867

[Function]

In spindle synchronization, the maximum value of the phase error between the reference spindle and the synchronized spindle is output.

In tool spindle synchronization II (Hobbing), when the hob axis and work axis rotate in synchronization, the maximum delay (advance) of the hob axis from the commanded position is output by angle.

(Note) This signal uses 1st spindle signal regardless of hob spindle number.

[Operation]

In spindle synchronization, the maximum value of the "Spindle synchronization phase error" (R6516) is output.

In the tool spindle synchronization II (Hobbing), when the hob axis and work axis rotate in synchronization, the maximum delay (advance) of the hob axis from the commanded position is output by angle.

The maximum value output is retained until the next spindle synchronization / tool spindle synchronization II turns ON or until the power turns OFF.

[Related signals]

(1) Hob axis delay excess (PHOVR:X18B3)

(2) Spindle synchronization phase error/Hob axis delay angle (R6516)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION PHASE OFFSET DATA		R6518	R6568	R6618	R6668	R6718	R6768	R6818	R6868

[Function]

With the spindle phase shift amount calculation function, the phase error of the reference spindle and synchronized spindle is obtained and memorized by turning the PLC signal ON at executing the spindle synchronization. The synchronized spindle can be rotated with the handle during the spindle phase shift calculation, so the phase relation between two spindles can be adjusted by seeing.

If the "Spindle phase synchronous control" (SPPHS) signal is input while the "Phase offset request" signal (SSPHF) is ON, the phase error will be aligned based on the position shifted by the memorized phase shift amount.

Such operation makes the phase alignment easy when clamping an irregular material over.

[Operation]

The phase error memorized by the phase shift calculation is output.

Unit: 360°/4096

(Note) This data is output only during the spindle synchronous control.

[Related signals]

(1) Spindle phase synchronization (SPPHS:Y18B1)

(2) Phase shift calculation request (SSPHM:Y18B3)

(3) Phase offset request (SSPHF:Y18B4)

(4) Spindle synchronization phase error/Hob axis delay angle (R6516)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION PHASE ERROR MONITOR		R6519	R6569	R6619	R6669	R6719	R6769	R6819	R6869

[Function]

The phase error during the spindle phase synchronous state can be monitored.

[Operation]

The phase error during the spindle phase synchronous control is output by the pulse unit.

[Related signals]

(1) Spindle synchronization phase error monitor (lower limit) (R6520)

(2) Spindle synchronization phase error monitor (upper limit) (R6521)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION PHASE ERROR MONITOR (lower limit)		R6520	R6570	R6620	R6670	R6720	R6770	R6820	R6870

[Function]

The phase error during the spindle phase synchronous state can be monitored.

[Operation]

The lower limit value of the phase error during the spindle phase synchronous control is output by the pulse unit.

[Related signals]

(1) Spindle synchronization phase error monitor (R6519)

(2) Spindle synchronization phase error monitor (upper limit) (R6521)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION PHASE ERROR MONITOR (upper limit)		R6521	R6571	R6621	R6671	R6721	R6771	R6821	R6871

[Function]

The phase error during the spindle phase synchronous state can be monitored.

[Operation]

The upper limit value of the phase error during the spindle phase synchronous control is output by the pulse unit.

[Related signals]

(1) Spindle synchronization phase error monitor (R6519)

(2) Spindle synchronization phase error monitor (lower limit) (R6520)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION PHASE ERROR 1		R6522	R6572	R6622	R6672	R6722	R6772	R6822	R6872

[Function]

(1) During spindle synchronous function (G114.1)

This signal informs the phase error (value including the phase error memorized with the spindle synchronization phase shift calculation function) when the phase synchronization (with R command) or the "Phase shift calculation request" signal (SSPHM) is ON. The phase error is output by 1° increment.

(2) During phase synchronization of polygon machining between spindles (G114.2)

This signal informs the phase error corresponding to the commanded phase shift amounts by 1° increment.

The data has no meaning in cases other than above.

[Operation]

(1) During spindle synchronous function (G114.1)

When the phase synchronization (with R command) or the "Phase shift calculation request" signal (SSPHM) is ON, and when the speeds of the reference spindle and the synchronized spindle are constant, the phase error between the reference spindle and the synchronized spindle is output.

(2) During phase synchronization of polygon machining between spindles (G114.2)

This signal informs the phase error corresponding to the commanded phase shift amounts by 1° increment.

[Related signals]

(1) Phase shift calculation request (SSPHM:Y18B3)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION PHASE ERROR 2		R6523	R6573	R6623	R6673	R6723	R6773	R6823	R6873

[Function]

(1) During spindle synchronous function (G114.1)

This signal informs the phase error (value excluding the phase error memorized with the spindle synchronization phase shift calculation function) when the phase synchronization (with R command) or the "Phase shift calculation request" signal (SSPHM) is ON. The phase error is output by 1° increment.

(2) During phase synchronization of polygon machining between spindles (G114.2)

This signal informs the phase error corresponding to the commanded phase shift amounts by 1° increment. (Same as R6522.)

The data has no meaning in cases other than above.

[Operation]

(1) During spindle synchronous function (G114.1)

When the phase synchronization (with R command) or the "Phase shift calculation request" signal (SSPHM) is ON, and when the speeds of the reference spindle and the synchronized spindle are constant, the phase error between the reference spindle and the synchronized spindle is output.

(2) During phase synchronization of polygon machining between spindles (G114.2)

This signal informs the phase error corresponding to the commanded phase shift amounts by 1° increment. (Same as R6522.)

[Related signals]

(1) Phase shift calculation request (SSPHM:Y18B3)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Spindle motor load ratio		R6525	R6575	R6625	R6675	R6725	R6775	R6825	R6875

[Function]

The spindle motor load ratio is output to this signal.

[Operation]

If the connected spindle drive does not support the decimal fraction output, this signal indicates 0.

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	LOAD MONITOR I : SPINDLE CUTTING TORQUE OUT-PUT VALUE		R6528	R6578	R6628	R6678	R6728	R6778	R6828	R6878

[Function]

Spindle cutting torque is output to these devices.

[Operation]

The cutting torque obtained by removing the torque in air cut is output to this signal.

Output unit: Rated torque %

”0x64” is output when the spindle cutting torque reaches 100%.

When the spindle cutting torque reaches -1%, ”0xffff” is output.

[Related signals]

(1) Load monitor I : Cutting torque estimation in progress (XCEE)

(2) Load monitor I : Cutting torque estimation completed (XCEF)

(3) Load monitor I : Cutting torque estimation execution (YCEF)

(4) Load monitor I : Cutting torque output value (R5492 to R5499)

(5) Load monitor I : Cutting torque estimation target axis (R22692)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE ALARM/WARNING NO.		R6529	R6579	R6629	R6679	R6729	R6779	R6829	R6879

[Function]

This signal indicates the alarm No./warning No. of spindle drive unit. (hexadecimal 2 digits)

This signal sets the 4-digit alarm No. which is displayed on the NC screen.

[Operation]

This signal is set up when the alarm/waring occurs in the spindle drive unit.

This signal will be cleared when the alarm/warning is canceled.

This signal is not set if the servo warning "S52 Control axis detach warning 00E6" or "S52 In NC emergency stop state 00E7" occurs.

If more than one alarm/warning occurs, the value displayed in the [LED display] of [Drive motor]-[Spindle unit] screen is set.

[Related signals]

(1) NC warning (servo warning) (XC9C)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SYNCHRONOUS TAPPING CUR-RENT ERROR WIDTH		R6532,3	R6582,3	R6632,3	R6682,3	R6732,3	R6782,3	R6832	R6882

[Function] [Operation]

The current value of the synchronous tapping error width (motor tracking delay from each position commands on the spindle and the tapping axis) is output during the synchronous tapping.

Positive output value means that the tapping axis is delayed, while negative output value means that the spindle is delayed. The output range is -99999.999 to 99999.999mm.

[Caution]

(1) The synchronous tapping error is not output during the spindle orientation or the R point positioning.

(2) The current value is kept retrieved during the synchronous tapping.

(3) If the synchronous tapping error is over the output range, the maximum value of the range is output.

(4) Execute the synchronous tap R-point in-position check before using this signal. Unless the synchronous tap R-point in-position check is executed, an illegal value of the synchronous tapping error may be detected.

[Related signals]

(1) Synchronous tapping Maximum error width (R6534, 6535)

(2) Synchronous tapping Current error angle (R6536, 6537)

(3) Synchronous tapping Maximum error angle (R6538, 6539)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SYNCHRONOUS TAPPING MAXI-MUM ERROR WIDTH		R6534,5	R6584,5	R6634,5	R6684,5	R6734,5	R6784,5	R6834,5	R6884,5

[Function] [Operation]

The largest absolute value of the synchronous tapping error width (-99999.999 to 99999.999mm) is output during the synchronous tapping.

The value is initialized to "0" when the synchronous tapping starts or the power turns ON again.

[Caution]

(1) The synchronous tapping error is not output during the spindle orientation or the R point positioning.

(2) This output value is the largest one throughout the synchronous tapping mode.

(3) If the synchronous tapping error is over the output range, the maximum value of the range is output.

(4) Execute the synchronous tap R-point in-position check before using this signal. Unless the synchronous tap R-point in-position check is executed, an illegal value of the synchronous tapping error may be detected.

[Related signals]

(1) Synchronous tapping Current error width (R6532, 6533)

(2) Synchronous tapping Current error angle (R6536, 6537)

(3) Synchronous tapping Maximum error angle (R6538, 6539)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SYNCHRONOUS TAPPING CUR-RENT ERROR ANGLE		R6536,7	R6586,7	R6636,7	R6686,7	R6736,7	R6786,7	R6836,7	R6886,7

[Function] [Operation]

The synchronous tapping error (motor tracking delay from each position commands on the spindle and the tapping axis) is output with angle during the synchronous tapping.

Positive output value means that the tapping axis is delayed, while negative output value means that the spindle is delayed. The output range is -99999.999 to 99,999.999°.

[Caution]

(1) The synchronous tapping error is not output during the spindle orientation or the R point positioning.

(2) The current value is kept retrieved during the synchronous tapping.

(3) If the synchronous tapping error is over the output range, the maximum value of the range is output.

(4) Execute the synchronous tap R-point in-position check before using this signal. Unless the synchronous tap R-point in-position check is executed, an illegal value of the synchronous tapping error may be detected.

[Related signals]

(1) Synchronous tapping Current error width (R6532, 6533)

(2) Synchronous tapping Maximum error width (R6534, 6535)

(3) Synchronous tapping Maximum error angle (R6538, 6539)

Con-tact	Signal name	Signal abbrevia-tion	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SYNCHRONOUS TAPPING MAXI-MUM ERROR ANGLE		R6538,9	R6588,9	R6638,9	R6688,9	R6738,9	R6788,9	R6838,9	R6888,9

[Function][Operation]

The largest absolute value of the synchronous tapping error angle (-99999.999 to 99,999.999°) is output during the synchronous tapping.

The value is initialized to "0" when the synchronous tapping starts or the power turns ON again. The value is kept retrieved and displayed during the synchronous tapping.

[Caution]

(1) The synchronous tapping error is not output during the spindle orientation or the R point positioning.

(2) This output value is the largest one throughout the synchronous tapping mode.

(3) If the synchronous tapping error is over the output range, the maximum value of the range is output.

(4) Execute the synchronous tap R-point in-position check before using this signal. Unless the synchronous tap R-point in-position check is executed, an illegal value of the synchronous tapping error may be detected.

[Related signals]

(1) Synchronous tapping Current error width (R6532, 6533)

(2) Synchronous tapping Maximum error width (R6534, 6535)

(3) Synchronous tapping Current error angle (R6536, 6537)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Load monitor I: Estimated spindle dis-turbance torque output		R6541	R6591	R6641	R6691	R6741	R6791	R6841	R6891

[Function]

The estimated disturbance torque of the spindle is output to these devices.

[Operation]

The estimated disturbance torque of the spindle is output to this signal.

Output unit: Stall current 0.01%

"0x2710" is output when the cutting torque reaches 100%.

"0xff9C" is output when the cutting torque reaches -1%.

[Related signals]

(1) Load monitor I : Axis selection (R2580)

(2) Load monitor I: Effective spindle torque output (R6542)

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Load monitor I: Effective spindle torque output		R6542	R6592	R6642	R6692	R6742	R6792	R6842	R6892

[Function]

The effective torque of the spindle is output to these devices.

[Operation]

The effective torque is output to this signal.

Output unit: Stall current % (#2634 SrvFunc01/bit0=0)

"0x64" is output when the effective torque reaches 100%.

"0xffff" is output when the effective torque reaches -1%.

[Related signals]]

(1) Load monitor I : Axis selection (R2580)

(2) Load monitor I: Estimated spindle disturbance torque output (R6541)

Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis
PLC AXIS INDEXING CONTROL STATUS 4	AUXST4	R8000	R8006	R8012	R8018	R8024	R8030

Contact	Signal name	Signal abbreviation	bit
A	Position switch 1 to 15	PSW1 to PSW15	AUXST4/bit0 to 7 AUXST3/bit9 to F

[Function][Operation]

This signal turns ON when the axis is within the setting range of the respective position switches.

Contact	Signal name	Signal abbreviation	bit
A	Start not possible	NST	AUXST4/bitB

[Function][Operation]

This signal turns ON when the Operation start signal is turned ON for non PLC indexing axis.

Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis
PLC AXIS INDEXING CONTROL STATUS 3	AUXST3	R8001	R8007	R8013	R8019	R8025	R8031

Contact	Signal name	Signal abbreviation	bit
A	Station position 1 to 256	STO1 to STO256	AUXST3/bit0 to 8

[Function][Operation]

This signal shows a 9-digit binary No. of the present station.

This signal outputs the station position when Set position reached (JST) is ON, "0" when Set position reached is OFF.

Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis
PLC AXIS INDEXING CONTROL STATUS 2	AUXST2	R8002	R8008	R8014	R8020	R8026	R8032

Contact	Signal name	Signal abbreviation	bit
A	In automatic operation mode	AUTO	AUXST2/bit0

[Function][Operation]

This signal indicates that the automatic operation mode has been selected.

Contact	Signal name	Signal abbreviation	bit
A	In manual operation mode	MANO	AUXST2/bit1

[Function][Operation]

This signal indicates that the manual operation mode has been selected.

Contact	Signal name	Signal abbreviation	bit
A	In JOG operation mode	JO	AUXST2/bit2

[Function][Operation]

This signal indicates that the JOG operation mode has been selected.

Contact	Signal name	Signal abbreviation	bit
A	In reference position return	ARNN	AUXST2/bit3

[Function][Operation]

This signal indicates that the machine is in the reference position return.

Contact	Signal name	Signal abbreviation	bit
A	In reference position return mode	ZRNO	AUXST2/bit4

[Function][Operation]

This signal indicates that the reference position return mode has been selected.

Contact	Signal name	Signal abbreviation	bit
A	In basic point initialization setting mode	AZSO	AUXST2/bit6

[Function][Operation]

This signal indicates that the basic point initialization setting mode has been selected.

Contact	Signal name	Signal abbreviation	bit
A	In incremental mode	SO	AUXST2/bit7

[Function][Operation]

This signal indicates that the incremental mode has been selected.

Contact	Signal name	Signal abbreviation	bit
A	Alarm 1	AL1	AUXST2/bit8

[Function][Operation]

This signal indicates that an alarm has occurred requiring the power to be turned ON again after the cause is removed.

Contact	Signal name	Signal abbreviation	bit
A	Alarm 2	AL2	AUXST2/bit9

[Function][Operation]

This signal indicates that an alarm has occurred which can be released by the Master reset (MRST) signal after the cause is removed.

Contact	Signal name	Signal abbreviation	bit
A	Alarm 4	AL4	AUXST2/bitA

[Function][Operation]

This signal indicates that an operation alarm or absolute position alarm has occurred.

Con-tact	Signal name	Signal ab-breviation	bit
A	Absolute position power shutoff movement over	ABS	AUXST2/bitC

[Function][Operation]

This signal indicates that the axis moved beyond the tolerable amount while the control power was OFF in the absolute position system.

Con-tact	Signal name	Signal ab-breviation	bit
A	Absolute position data loss	ZSN	AUXST2/bitD

[Function][Operation]

This signal indicates that the absolute position data has been lost in the absolute position system.

Con-tact	Signal name	Signal ab-breviation	bit
A	Initialization setting completed	ZSF	AUXST2/bitE

[Function][Operation]

This signal indicates that in the absolute position system the basic point initialization setting has completed normally, and that the absolute position coordinates have been established.

Con-tact	Signal name	Signal ab-breviation	bit
A	Initialization setting error completed	ZSE	AUXST2/bitF

[Function][Operation]

This signal indicates that the basic point initialization setting has not finished normally in the absolute position system.

Signal name	Signal ab-breviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis
PLC AXIS INDEXING CONTROL STATUS 1	AUXST1	R8003	R8009	R8015	R8021	R8027	R8033

Con-tact	Signal name	Signal ab-breviation	bit
A	Servo ready	RDY	AUXST1/bit0

[Function]

This signal indicates that the servo system is in an operable status.

[Operation]

This signal turns ON when:

(1) The servo system diagnosis is normally completed after turning the power ON.
(2) The servo alarm, which had occurred, has been released by Master reset (MRST).
(3) The emergency stop has been released.
(4) Ready OFF (RDF) or Servo OFF (SVF) has been released.

This signal turns OFF when:

(1) Servo ready completion (SA) is turned OFF.
(2) The Servo OFF signal is input and the drive unit is in a servo OFF state.

[Related signals]

(1) Master reset (MRST: AUXCM1/bit3)
(2) Ready OFF (RDF: AUXCM1/bit6)
(3) Servo OFF (SVF: AUXCM1/bit0)
(4) Servo ready completion (SA: AUXST1/bitC)

Con-tact	Signal name	Signal ab-breviation	bit
A	In-position	INP	AUXST1/bit1

[Function]

This signal notifies that the control axis is in-position.

[Operation]

This signal turns ON when:

(1) Smoothing zero (SMZ) is turned ON and the droop is within the range set in the parameters.

This signal turns OFF when:

(1) Smoothing zero (SMZ) is turned OFF. (When there is a movement command.)

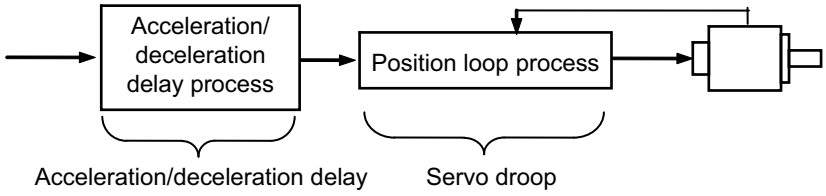
(2) The droop exceeds the range set in the parameters.

[Caution]

(1) In-position (INP) may turn ON, even during movement, when the axis is moving at extremely low speeds.

(2) The in-position detection range is set in the parameter "#2224 SV024 In-position detection width".

(3) In the servo ready OFF state, Smoothing zero (SMZ) turns OFF when the travel amount of servomotor is detected. Therefore, In-position (INP) also turns OFF. In axis plus motion (MVP) or In axis minus motion (MVN) turns ON depending on the detected movement direction. Note that Smoothing zero (SMZ), In axis plus motion (MVP) and In axis minus motion (MVN) will not change in the servo OFF state without error correction, because detected servomotor travel amount becomes a droop amount.



[Related signals]

(1) Smoothing zero (SMZ: AUXST1/bit2)

Con-tact	Signal name	Signal ab-breviation	bit
A	Smoothing zero	SMZ	AUXST1/bit2

[Function][Operation]

This signal indicates that the acceleration/deceleration process in the built-in controller is finished, and that no command to the control section remains.

Con-tact	Signal name	Signal ab-breviation	bit
A	Axis selection output	AX1	AUXST1/bit3

[Function]

This signal indicates that the control axis has received the movement command.

[Operation]

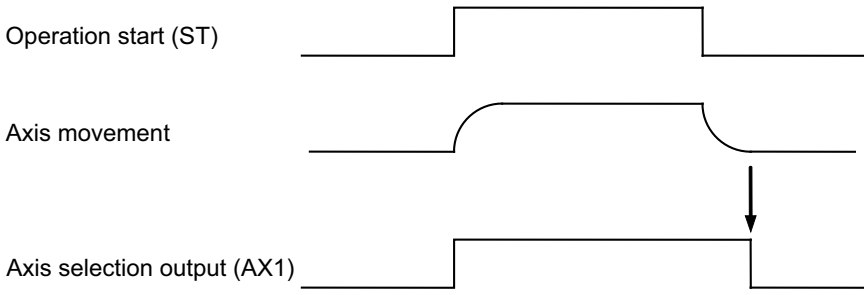
This signal turns ON in the following cases, and turns OFF after Smoothing zero (SMZ) is detected.

(1) In automatic operation mode
This signal turns ON while Operation start (ST) is ON and the axis is moving.

(2) In manual operation mode
This signal turns ON while Operation start (ST) is ON and the axis is moving.

(3) In JOG operation mode
This signal turns ON while Operation start (ST) is ON and the axis is moving.

(4) In reference poisition return mode
This signal turns ON while Operation start (ST) is ON and the axis is moving.
When an interlock is applied, this signal remains ON even when the servo is OFF. This signal turns OFF atthe emergency stop.



[Related signals]

(1) Operation start (ST: AUXCM2/bit0)

Con-tact	Signal name	Signal ab-breviation	bit
A	In axis plus motion	MVP	AUXST1/bit4

[Function]

This signal indicates that the axis is moving in the (+) direction.

[Operation]

This signal turns ON when the axis starts moving in the (+) direction, turns OFF after Smoothing zero (SMZ) is detected or the axis starts moving in the (-) direction.

[Related signals]

(1) Smoothing zero (SMZ: AUXST1/bit2)

Con-tact	Signal name	Signal ab-breviation	bit
A	In axis minus motion	MVM	AUXST1/bit5

[Function]

This signal indicates that the axis is moving in the (-) direction.

[Operation]

This signal turns ON when the axis starts moving in the (-) direction, turns OFF after Smoothing zero (SMZ) is detected or the axis starts moving in the (+) direction.

[Related signals]

(1) Smoothing zero (SMZ: AUXST1/bit2)

Contact	Signal name	Signal abbreviation	bit
A	In torque limit	TLQ	AUXST1/bit6

[Function][Operation]

This signal indicates that the control axis is at the current limit value. This signal turns ON when the motor output torque (motor current) is limited at the torque limit value of the selected operation parameter group.

Contact	Signal name	Signal abbreviation	bit
A	Reference position reached	ZP	AUXST1/bit8

[Function]

Thsi signal indicates that the control axis is on the reference position.

[Operation]

This signal turns ON when the reference position is reached in the reference position return mode.

If the reference position is reached in other operation modes or by other commands, the signal will not turn ON.

This signal turns OFF when:

(1) The axis is moved by a travel command, etc.

(2) An emergency stop has been activated due to an emergency stop input or a servo alarm occurrence, etc.

(3) The axis has moved in the servo OFF state.

[Related signals]

(1) Reference position return mode (ZRN: AUXCM1/bitB)

Contact	Signal name	Signal abbreviation	bit
A	In reset	RST	AUXST1/bit9

[Function]

This signal indicates that the built-in controller is being reset.

[Operation]

The signal turns ON when:

(1) Master reset (MRST) is turned ON.

(2) Master reset (MRST) is turned ON and the built-in controller is being reset.

(3) In an emergency stop status.

[Related signals]

(1) Master reset (MRST: AUXCM1/bit3)

Contact	Signal name	Signal abbreviation	bit
A	In handle feed operation mode	HO	AUXST1/bitA

[Function][Operation]

This signal indicates that handle feed operation mode is selected.

Contact	Signal name	Signal abbreviation	bit
A	Controller ready completion	MA	AUXST1/bitB

[Function]

This signal indicates that the controller is in a status to carry out normal operation.

[Operation]

This signal turns ON when:

(1) Normal operation has begun after the power ON.

This signal turns OFF when:

(1) The power is turned OFF.

(2) An error with the controller, such as CPU error or memory error, has been detected.

(3) A servo error, which cannot be released unless the controller is first turned OFF, has occurred.

Con-tact	Signal name	Signal ab-breviation	bit
A	Servo ready completion	SA	AUXST1/bitC

[Function]

This signal indicates that the servo system is ready for normal operation. In other words, the servo system (position control) is not working when the signal is OFF.

[Operation]

The signal turns ON when:

(1) The servo system diagnosis is normally completed after the power ON.
(2) The servo alarm, which had occurred, has been released by Master reset (MRST).
(3) The emergency stop has been released.
(4) Ready OFF (RDF) is turned ON.

This signal turns OFF when:

(1) Controller ready completion (MA) is turned OFF.
(2) A servo alarm has occurred.
(3) Emergency stop is issued.
(4) Ready OFF (RDF) is turned OFF.

[Caution]

(1) With Servo OFF (SVF), Servo ready completion (SA) will not turn OFF as long as there are no separate conditions for turning the SA OFF.
(2) In an emergency stop status, all I/O output points will turn OFF.

[Related signals]

(1) Master reset (MRST: AUXCM1/bit3)
(2) Ready OFF (RDF: AUXCM1/bit6)
(3) Controller ready completion (MA: AUXST1/bitB)

Con-tact	Signal name	Signal ab-breviation	bit
A	Automatic set position reached	JSTA	AUXST1/bitD

[Function]

In the automatic operation, this signal notifies that the positioning to the commanded station No. is completed. The tolerable ON width is as same as that of Set position reached (JST).

[Operation]

The signal turns ON when:

(1) The positioning to the designated station No. is completed in the automatic operation mode. The signal actually turns ON before the positioning is completed, when the tolerable width is entered.

The signal turns OFF when:

(1) When the Operation start signal is input in any of the operation modes.
(2) When the axis deviates outside the tolerable width.

[Caution]

(1) In automatic operation, this signal does not turn ON when positioning to the nearest station is carried out by the Operation start signal OFF.
(2) When this signal is ON, it does not turn OFF if the same station No. index is started.
(3) When the positioning to the station is completed in manual mode and the same station No. index is started, this signal turns ON. However, there is no movement.
(4) Once turned OFF, this signal does not turn ON again even if the axis returns within the tolerable width.
(5) During the emergency stop or the servo OFF, the axis movement, once deviated outside the output width of Set position reached, returns within the tolerable width, turns this signal ON again if "#12802 aux_Cont1/bit4" is OFF; does not turn it ON if "#12802 aux_Cont1/bit4" is ON.

Contact	Signal name	Signal abbreviation	bit
A	Set position reached	JST	AUXST1/bitE

[Function]

This signal notifies that the positioning to the station position has been completed. It is ON when the machine position is at any of the station positions. The tolerable ON width is set with a parameter.

[Operation]

The signal turns ON when:

(1) The positioning to the station is completed in automatic or manual operation. The signal actually turns ON before the positioning is completed, when the tolerable width is entered.

(2) The stop position after JOG operation is the station position or within the tolerable width.

(3) The reference position return position corresponds to those of the stop position in (2).

Other than the above conditions, this signal normally monitors the machine position, and carries out comparisons between stations. Therefore, this signal is output even when the machine moves to a station position outside the operation.

The signal turns OFF when:

(1) The Operation start signal is input in any of the operation modes. When the operation is started by the Operation start signal, this signal will not turn ON, even when a station position is passed during operation.

(2) The axis deviates outside the tolerable width.

Contact	Signal name	Signal abbreviation	bit
A	Near set position	NEAR	AUXST1/bitF

[Function]

This signal notifies that the machine position is near the station.

[Operation]

It operates in the same manner as the Set position reached (JST), but the tolerable width is set with a different parameter. The tolerable width is generally set larger than that of Set position reached. This signal is generally used at the mechanical clamp or the like just before the completion of the positioning.

Contact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP
A	OPTIMUM ACCELERATION/DECELERATION ESTIMATED INERTIA LEVEL N-TH AXIS	SPEST1 to 4	R8290	R8291	R8292	R8293

[Function]

This signal outputs the estimated inertia level that is stored by inertia teaching.

[Operation]

- The output range for the estimated inertia level is from 0 to 3.
  - 0: Standard (standard inertial mass)
  - 1: Level 1 (medium inertial mass)
  - 2: Level 2 (big inertial mass)
  - 3: Level 3 (huge inertial mass)
- The estimated inertia level is kept even the power is turned OFF.
- "0: Standard" is applied for the spindle whose inertial level is not estimated.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	RIOn NO. OF ERROR OCCURRENCES n-TH CH		R10000 to 23

[Function]

Counts communication errors occurred between control unit and remote I/O unit (channel) and outputs.

[Operation]

R register's high-order 8 bits output the number of CRC error occurrences (highest value), and the low-order 8 bits output the number of connection error occurrences (highest value).

R register allocations are as shown below.

Remote I/O unit connection system	1st ch	2nd ch	3rd ch	4th ch	5th ch	6th ch	7th ch	8th ch
RIO1	R10000	R10001	R10002	R10003	R10004	R10005	R10006	R10007
RIO2	R10008	R10009	R10010	R10011	R10012	R10013	R10014	R10015
RIO3	R10016	R10017	R10018	R10019	R10020	R10021	R10022	R10023

[Caution]

(1) Control unit cannot identify the remote I/O unit with no power cable or communication cable connected, or with no power supplied. Therefore, issuance of remote I/O error will not be carried out even if a malfunction exists in those remote I/O units.

(2) Performance check for the physically existed remote I/O unit can be done, using either "Connection status output" or "No. of error occurrences output".

(3) Once the number of error occurrences exceeds 255, a remote I/O error occurs and "Error occurrences output" is clamped to 255.

(4) "No. of error occurrences output" is saved in full when rebooting.
However, when the value exceeds the specified value to lead a remote I/O error, the data of the channel is cleared.

[Related signals]

(1) Connection status of each channel RIO1,2 (R10064)

(2) Connection status of each channel RIO3 (R10065)

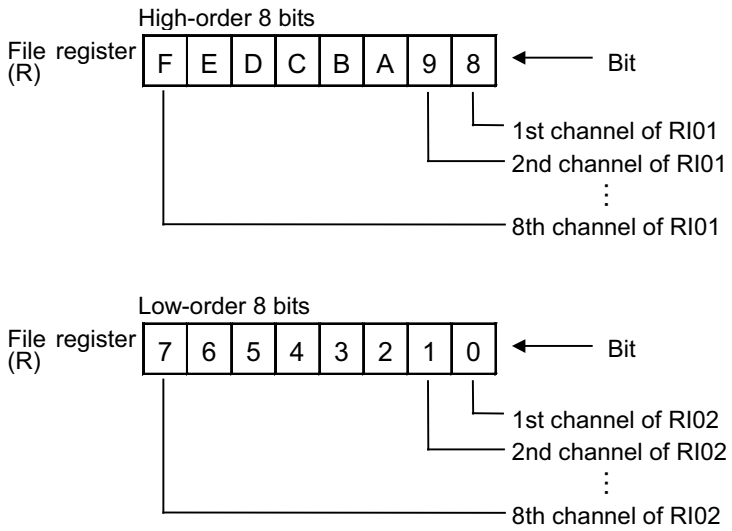
Con-tact	Signal name	Signal abbreviation	Common for part systems
A	CONNECTION STATUS OF EACH CHANNEL RIO1,2		R10064

[Function]

Connection status of remote I/O unit channel 1 & 2 is constantly output to R register.

[Operation]

When remote I/O unit is connected, "1" is set; when not connected, "0" is set.R register's high-order 8 bits output the connection status of each channel within RI01, and the lower 8 bits output the connection status of each channel within RI02.



[Caution]

(1) Control unit cannot identify the remote I/O unit with no power cable or communication cable connected, or with no power supplied. Therefore, the "Connection status output" for those remote I/O units is "0".

(2) Performance check for the physically existed remote I/O unit can be done, using either "Connection status output" or "No. of error occurrences output".

[Related signals]

(1) Connection status of each channel RIO3 (R10065)

(2) No. of error occurrences (R10000 to 23)

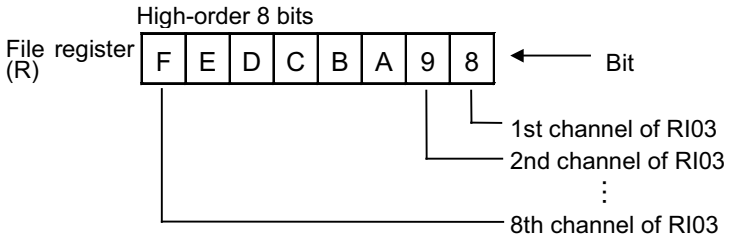
Con-tact	Signal name	Signal abbreviation	Common for part systems
A	CONNECTION STATUS OF EACH CHANNEL RIO3		R10065

[Function]

Connection status of remote I/O unit channel 3 is constantly output to R register.

[Operation]

When remote I/O unit is connected, "1" is set; when not connected, "0" is set.R register's high-order 8 bits output the connection status of each channel within RI03.



[Caution]

(1) Control unit cannot identify the remote I/O unit with no power cable or communication cable connected, or with no power supplied. Therefore, the "Connection status output" for those remote I/O units is "0".

(2) Performance check for the physically existed remote I/O unit can be done, using either "Connection status output" or "No. of error occurrences output".

[Related signals]

(1) Connection status of each channel RIO1,2 (R10064)

(2) No. of error occurrences (R10000 to 23)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	EcoMonitorLight CONNECTION: STATION #1 to #16 CONSUMED POWER		R14000, 1 to R14150, 1

[Function]

This signal stores the consumed power of EcoMonitorLight which is collected at a fixed period.

The consumed power is stored across two words of register; the values of first to 1000th digit are stored to R14000 and the values of 10000th digit and above are stored to R14001.

Station No.	Device No.
Station #1	R14000, 1
Station #2	R14010, 1
Station #3	R14020, 1
Station #4	R14030, 1
Station #5	R14040, 1
Station #6	R14050, 1
Station #7	R14060, 1
Station #8	R14070, 1
Station #9	R14080, 1
Station #10	R14090, 1
Station #11	R14100, 1
Station #12	R14110, 1
Station #13	R14120, 1
Station #14	R14130, 1
Station #15	R14140, 1
Station #16	R14150, 1

[Operation]

Updated every other second.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	EcoMonitorLight CONNECTION: STATION #1 to #16 REGENERATED POWER		R14002, 3 to R14152, 3

[Function]

This signal stores the regenerated power of EcoMonitorLight which is collected at a fixed period.

The regenerated power is stored across two words of register; the values of first to 1000th digit are stored to R14002 and the values of 10000th digit and above are stored to R14003.

Station No.	Device No.
Station #1	R14002, 3
Station #2	R14012, 3
Station #3	R14022, 3
Station #4	R14032, 3
Station #5	R14042, 3
Station #6	R14052, 3
Station #7	R14062, 3
Station #8	R14072, 3
Station #9	R14082, 3
Station #10	R14092, 3
Station #11	R14102, 3
Station #12	R14112, 3
Station #13	R14122, 3
Station #14	R14132, 3
Station #15	R14142, 3
Station #16	R14152, 3

[Operation]

Updated every other second.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	EcoMonitorLight CONNECTION: STATION #1 to #16 NUMBER OF RECEPTION ERRORS		R14200 to R14350
A	EcoMonitorLight CONNECTION: STATION #1 to #16 MAXIMUM NUMBER OF SUCCESSIVE RECEPTION ERRORS		R14201 to R14351
A	EcoMonitorLight CONNECTION: STATION #1 to #16 NUMBER OF TRANSMISSION ERRORS		R14202 to R14352
A	EcoMonitorLight CONNECTION: STATION #1 to #16 MAXIMUM NUMBER OF SUCCESSIVE TRANSMISSION ER-RORS		R14203 to R14353

[Function]

This signal stores the number of reception errors, maximum number of successive reception errors, number of transmission errors, and maximum number of successive transmission errors of EcoMonitorLight.

	Device No.			
Station No.	No. of reception errors	Max. No. of successive reception errors	No. of transmission errors	Max. No. of successive transmission errors
Station #1	R14200	R14201	R14202	R14203
Station #2	R14210	R14211	R14212	R14213
Station #3	R14220	R14221	R14222	R14223
Station #4	R14230	R14231	R14232	R14233
Station #5	R14240	R14241	R14242	R14243
Station #6	R14250	R14251	R14252	R14253
Station #7	R14260	R14261	R14262	R14263
Station #8	R14270	R14271	R14272	R14273
Station #9	R14280	R14281	R14282	R14283
Station #10	R14290	R14291	R14292	R14293
Station #11	R14300	R14301	R14302	R14303
Station #12	R14310	R14311	R14312	R14313
Station #13	R14320	R14321	R14322	R14323
Station #14	R14330	R14331	R14332	R14333
Station #15	R14340	R14341	R14342	R14343
Station #16	R14350	R14351	R14352	R14353

[Operation]

The number of reception errors and the number of transmission errors is incremented when an error occurs on the communication with EcoMonitorLight.

The maximum number of successive reception errors is updated when the number of successive communication error is larger than the value of R14201.

The maximum number of successive transmission error is updated when the number of successive communication error is larger than the value of R14203.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	EcoMonitorLight CONNECTION: COMPLETION BIT		R14400

[Function]

This bit indicates the completion of the power value collecting function.

[Operation]

Bit0 becomes 1 upon completion of collection.

The bit is cleared to zero in the next cycle.

Contact	Signal name	Signal abbreviation	Common for part systems
A	EcoMonitorLight CONNECTION: COMPLETION STATUS		R14401

[Function]

This signal stores the completion status information of the power value collecting function.

[Operation]

0 indicates the completion.

Non-zero indicates the error.

Error code	Error description
1	Address setting illegal
2	Reception timeout error
3	Reception frame error (CRC error)
4	Function setting illegal
5	Station No. setting illegal
6	Size setting illegal
7	Transmission timeout error

Contact	Signal name	Signal abbreviation	Common for part systems
A	EcoMonitorLight CONNECTION: ACQUIRED DATA		R14402 to R14405

[Function]

This signal stores the acquired data of the power value collecting function.

[Operation]

The acquired power value is stored.

Contact	Signal name	Signal abbreviation	Common for part systems
A	MES interface library: Serial number		R14500 to R14531

[Function]

This signal specifies the serial number of the workpiece.

[Operation]

Set the ASCII code (hex number) corresponding to the character you want to set.

Contact	Signal name	Signal abbreviation	Common for part systems
A	MES interface library: Operator ID		R14532 to R14563

[Function]

This signal specifies the operator ID

[Operation]

Set the ASCII code (hex number) corresponding to the character you want to set.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MES interface library: NC unit number		R14564 to R14571

[Function]

This signal displays the CNC unit number which sends the information to the database.

[Operation]

This data is automatically set at NC startup.

If the unit has a product number, this will set the ASCII code (hex number) corresponding to the product number.

If the unit does not have a product number, this will be set to "0".

When the MES interface library function is invalid, this signal is set to "0".

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MES interface library: Line number		R14572 to R14587

[Function]

This signal specifies the line number.

[Operation]

Set the ASCII code (hex number) corresponding to the character you want to set.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MES interface library: Machine type		R14588

[Function]

This signal displays the machine type (machining center or lathe) of the machine.

[Operation]

This data is automatically set at NC startup.

This sets the ASCII code (hex number) corresponding to "M" (0x4D) for the machining center system, or "L" (0x4C) for the lathe system.

When the MES interface library function is invalid, this signal is set to "0".

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MES interface library: DB connection status		R14589

[Function]

This signal indicates the connection status between the DB access task and the DB.

[Operation]

0: Not connected

1: Connected

When the MES interface library function is invalid, this signal is set to "0".

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MES interface library: MES event command info (Registration request register)		R14590

[Function]

This is the register for NC control firmware (including the ladder) to request DB registration.

This is used to initiate the handshake between the MES interface function and the database.

[Operation]

bit0: Used for registering the machining information in the DB.

bit1: Used for registering the alarm information in the DB.

[Related signals]

(1) MES interface library: MES app status info (Registration reception register) (R14591)

(2) MES interface library: MES app result register (R14592 to R14597)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MES interface library: MES app status info (Registration reception register)		R14591

[Function]

This register represents the reception status of the MES function for the DB registration requested from the NC control firmware (including the ladder).

This is used to initiate the handshake between the MES interface function and the database.

[Operation]

bit0: Used for registering the machining information in the DB.

bit1: Used for registering the alarm information in the DB.

[Related signals]]

(1) MES interface library: MES event command info (Registration request register) (R14590)

(2) MES interface library: MES app result register (R14592 to R14597)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MES interface library: MES app result register		R14592 to R14597

[Function]

This is the register to inform the requestor of the process result of the MES function.

This is used to initiate the handshake between the MES interface function and the database.

[Operation]

0: Normal end

Other than 0: Occurrence of an error

Which registers to use vary for each registration function.

R14592 R14593: Used for registering the machining information in the DB.

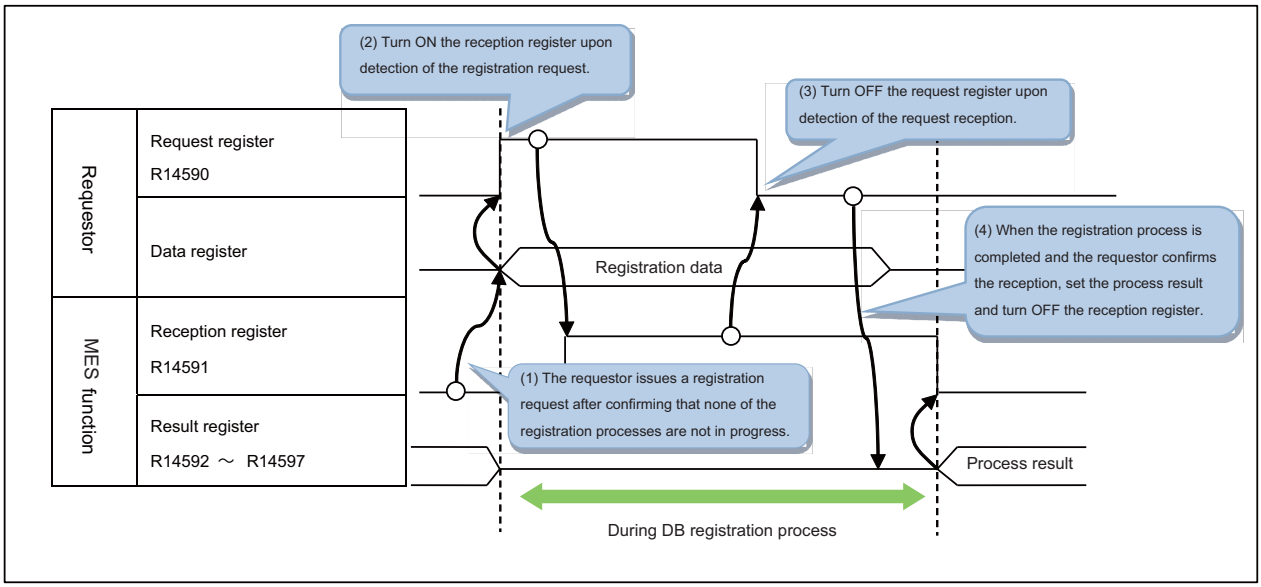
R14594 R14595: Used for registering the alarm information in the DB.

[Related signals]

(1) MES interface library: MES event command info (Registration request register) (R14590)

(2) MES interface library: MES app status info (Registration reception register) (R14591)

The timing chart for the registration request register, the registration reception register and the result register is as follows.


(2) Turn ON the reception register upon detection of the registration request.
(3) Turn OFF the request register upon detection of the request reception.
Requestor
Request register
R14590
Data register
Registration data
(4) When the registration process is completed and the requestor confirms the reception, set the process result and turn OFF the reception register.
MES function
Reception register
R14591
Result register
R14592 ～ R14597
(1) The requestor issues a registration request after confirming that none of the registration processes are not in progress.
Process result
During DB registration process

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	T CODE DATA FOR L SYSTEM		R20536, 7	R20736, 7	R20936, 7	R21136, 7	R21336, 7	R21536, 7	R21736, 7	R21936, 7

[Function]

When and "#11038 T disp typ" is set to "1" in a lathe system and a tool function is commanded by automatic operation (memory, MDI), it will notify number of tool function address T. T code data 1-4 notify the tool number only, but this signal notifies the tool command number that is commanded by machining program.

T code data that is output by controller can be selected from 8-digit BCD data, a unsigned 32-bit binary data, or signed 32-bit binary data, by parameter "#12010 Tbin".

[Operation]

Program example

O100
N010 G28XYZ
N020 T0102

(1) In case of executing N020 T0102 command when "#11038 T disp typ" is set to "1":

L system T code data (R20536) = 0x66
T code data (R536) = 0x01

(2) In case of executing N020 T0102 command when "#11038 T disp typ" is set to "0"

L system T code data (R20536) = 0
T code data (R536) = 0x01

Data remain unchanged even when "M function finish" signal (FIN1 or FIN2) is sent back. "Reset" or "Emergency stop" does not clear the data.

[Caution]

(1) Commanding "Txx" by manual numerical input would not update this signal. It is T code data 1 that will be updated.
(2) When "#11038 T disp typ" is set to "0", this signal will be cleared.
(3) In a M (machining center) system, this signal will be cleared.

[Related signals]

(1) T function strobe 1 (TF1:XC68)
(2) T code data 1 (R536-R537)

4.3 PLC Output Signals (Bit Type: Y***)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	POWER CONSUMPTION COMPUTATION: CLEAR CONSUMPTION ACCUMULATION 1 to 4	IPCC1 to 4	Y700 to 3

[Function]

This signal clears a variety of accumulated power consumption.

[Operation]

Turning ON this signal allows to clear the following accumulated power consumption.

- Accumulated consumption of entire drive system 1 to 4 (R122 to 9)
- Accumulated consumption of devices other than drive system 1 to 4 (R130 to 7)
- Total accumulated consumption 1 to 4
- Drive system's fixed consumption correction 1 to 4
- Accumulated consumption of servo axis in drive system (fluctuating part) 1 to 4
- Accumulated regeneration of servo axis in drive system (fluctuating part) 1 to 4
- Accumulated consumption of spindle in drive system (fluctuating part) 1 to 4
- Accumulated regeneration of spindle in drive system (fluctuating part) 1 to 4

[Related signals]

(1) Power consumption computation: Clearing consumption accumulation 1 to 4 complete (IPCCC1 to 4: X708 to B)
(2) Power consumption computation: Accumulated consumption of entire drive system 1 to 4 (DTIPC1 to 4: R122 to 9)
(3) Power consumption computation: Accumulated consumption of devices other than drive system 1 to 4 (NDIPC1 to 4:R130 to 7)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	INTEGRATION TIME INPUT 1	RHD1	Y704

[Function]

The total duration of a signal specified by a user PLC can be counted and displayed. For this, integration time input 1 and 2 are available.

[Operation]

The INTEGRAL TIME during this signal (RHD1) has been ON is displayed in hours, minutes, and seconds.
The counted (integrated) time is held even when the power is turned OFF. The integration time can be preset or reset.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	INTEGRATION TIME INPUT 2	RHD2	Y705

[Function][Operation]

Both functions and operations are the same as those of "Integration time input 1 (RHD1)". See the descriptions on "Integration time input 1 (RHD1)".

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus TIME-OUT 1 CANCEL	MDBUSRST 1	Y706

[Function]

This signal cancels the detection of Modbus time-out 1.

[Operation]

When this signal turns ON, the Modbus time-out 1 signal (MDBUSER2) turns OFF.
When the detection of Modbus time-out signal 1 is canceled by this signal, the transfer of the stopped block will restart.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus TIME-OUT 2 CANCEL	MDBUSRST 2	Y707

[Function]

This signal cancels the detection of Modbus time-out 2.

[Operation]

When this signal turns ON, the Modbus time-out 2 signal (MDBUSER2) turns OFF.

When the detection of Modbus time-out signal 2 is canceled by this signal, the transfer of the stopped block will restart.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
B	DATA PROTECT KEY 1	*KEY1	Y708

[Function]

Data pertinent to tool functions, and coordinate data (origin reset) can be protected with this signal.

[Operation]

When this signal is turned OFF (set to "0"), the tool data setting operation is prohibited.

[Caution]

(1) If a setting is changed while the signal (KEY1) is OFF, DATA PROTECT appears in the message section of screen. Manual numerical command input is not applicable in "TOOL/OFFSET" display mode.

(2) The signal (KEY1) is ON (set to "1") when the power is turned ON (data are not protected). Therefore, if the signal is not turned OFF in sequential control program, it remains turned ON ("1").

[Related signals]

(1) Data protect key 2 (*KEY2: Y709)

(2) Data protect key 3 (*KEY3: Y70A)

Con-tact	Signal name	Signal abbreviation	Common for part systems
B	DATA PROTECT KEY 2	*KEY2	Y709

[Function]

Data pertinent to user parameters and common variables can be protected.

[Operation]

When this signal (KEY2) is turned OFF (0), the parameter and common variable setting operation is prohibited.

[Caution]

(1) If a setting is changed while the signal (KEY2) is OFF (0), DATA PROTECT appears in the message section of CRT screen.

(2) The signal (KEY2) is ON (set to "1") when the power is turned ON (data are not protected). Therefore, if the signal is not turned OFF in sequential control program, it remains turned ON ("1").

[Related signals]

(1) Data protect key 1 (*KEY1: Y708)

(2) Data protect key 3 (*KEY3: Y70A)

Con-tact	Signal name	Signal abbreviation	Common for part systems
B	DATA PROTECT KEY 3	*KEY3	Y70A

[Function]

Data pertinent to machining program can be protected.

[Operation]

When this signal (KEY3) is turned OFF (0), the editing of the machining program is prohibited.

[Caution]

(1) If data is edited when the data protect key 3 is OFF (0), DATA PROTECT will appear in the message section.

(2) The signal (KEY3) is ON (set to "1") when the power is turned ON (data are not protected). Therefore, if the signal is not turned ON in sequential control program, it remains turned ON ("1").

[Related signals]

(1) Data protect key 1 (*KEY1: Y708)

(2) Data protect key 2 (*KEY2: Y709)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PROGRAM DISPLAY DURING OPERATION	PDISP	Y70C

[Function]

This signal is used to display a program ON the Word Edit screen during operation.

[Operation]

When the program display during operation signal (PDISP) turns ON, the program being operated will appear in the program display of the EDIT screen.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	HANDLE PULSE ENCODER COMMUNICATION CON-NECTOR PRIORITY		Y70D

[Function][Operation]

Priority of handle input pulse is determined when the parameter "#1239 set11 bit1(handle I/F selection)" is OFF.

0: Remote I/O connecting handle priority

1: Handle pulse encoder communication connector connecting handle priority

[Related signals]

(1) Handy terminal key 1 to 45 (X1CD0 to X1CFC)

(2) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)

(3) Handle/incremental feed magnification method selection (MPS: YC87)

(4) Handy terminal Data area top address (R297)

(5) Handy terminal Data valid number of registers (R298)

(6) Handy terminal Cause of communication error (R299)

(7) 1st handle/incremental feed magnification (R2508, R2509)

Con-tact	Signal name	Signal abbreviation	Common for part systems
B	PLC AXIS NEAR POINT DETECTION n-TH AXIS	*PCD1 to 6	Y718 to D

[Function]

The near point dog signal of the PLC axis reference position return is input.

[Operation]

Set the near point dog signal of the PLC axis reference position return for the following devices in the PLC.

Device No.		Signal name
Y718	PCD1	PLC axis near point detection 1st axis
Y719	PCD2	PLC axis near point detection 2nd axis
Y71A	PCD3	PLC axis near point detection 3rd axis
Y71B	PCD4	PLC axis near point detection 4th axis
Y71C	PCD5	PLC axis near point detection 5th axis
Y71D	PCD6	PLC axis near point detection 6th axis

(Note) If the dog signal is set during the PLC middle-speed process, the response will be poorer than when the dog signal is set with the PLC high-speed process.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PLC AXIS n-TH HANDLE VALID	PCHn	Y720 to 2

[Function]

This is designated when handle feed is to be carried out with the PLC axis.

[Operation]

Designate with the following devices when carrying out handle feed with the PLC axis.

Device No.		Signal name
Y720	PCH1	PLC axis 1st handle valid
Y721	PCH2	PLC axis 2nd handle valid
Y722	PCH3	PLC axis 3rd handle valid

(Note 1) When this signal is ON, each handle will be exclusive for the PLC axis. The handle will not be valid for the NC control axis.
The "1st handle axis selection code" (HS11 to 116, HS11S), the "2nd handle axis selection code" (HS21 to 216, HS21S) and "3rd handle axis selection code" (HS31 to 316, HS31S) are used to select each handle axis.

(Note 2) The handle feed magnification is common with that for the NC control axis.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PLC AXIS CONTROL BUFFERING MODE VALID	PABMI	Y723

[Function] [Operation]

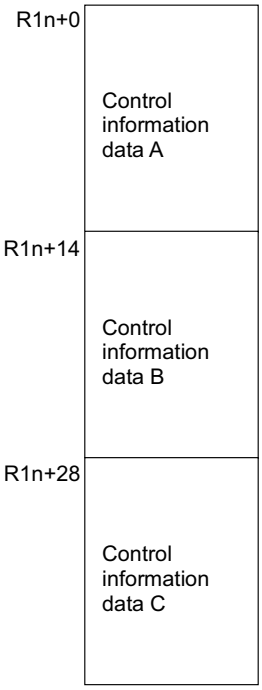
In buffering mode, the PLC axis command (control information data) can be commanded to multiple blocks. This enables a smooth changeover of commands.

<Control information data>

The control data for the buffering mode is set in three blocks. The contents of each control information data have the same configuration as the normal control information data.

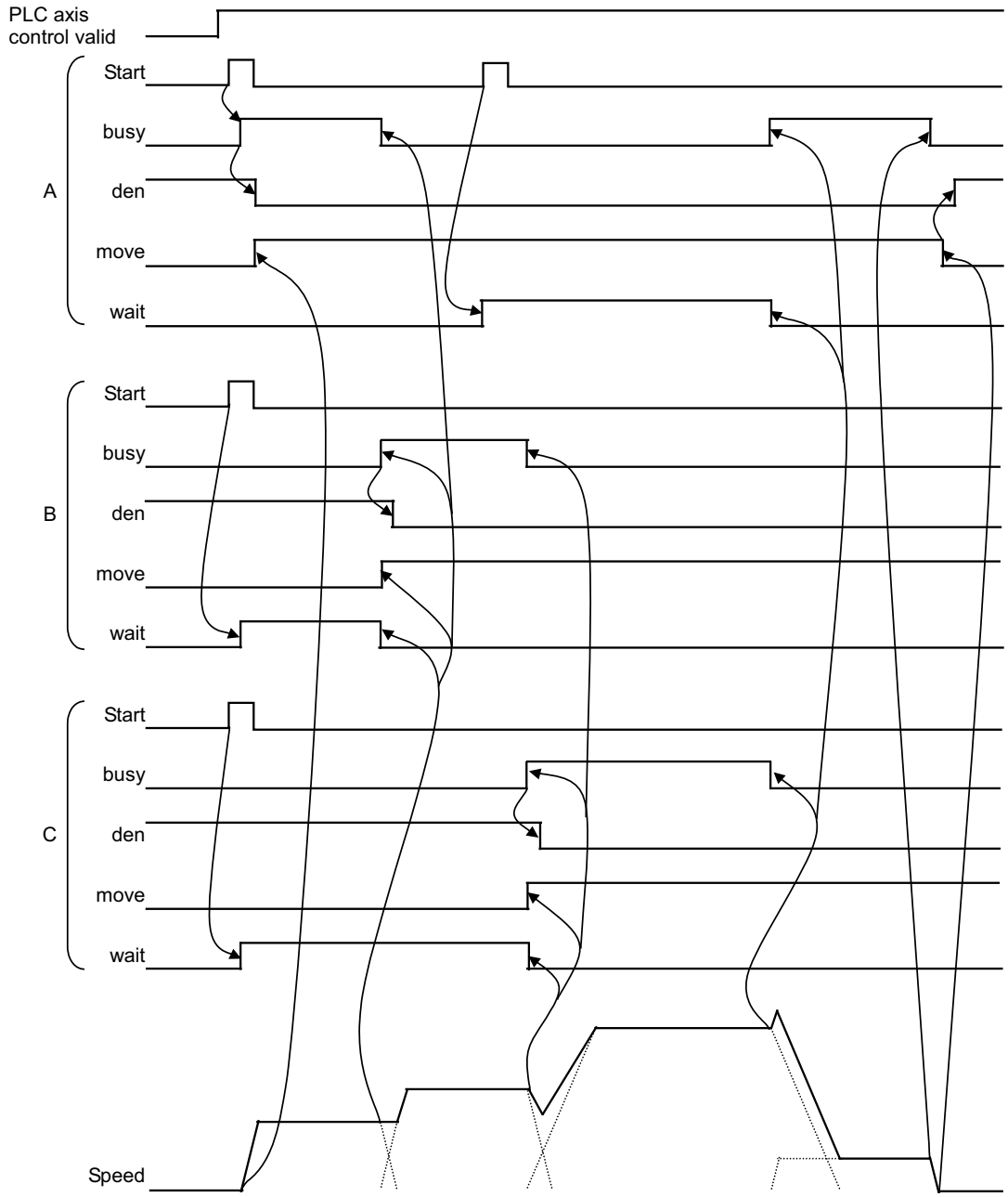
When executing, the axis moves in the order that each control information data has been started. When the movement is completed, it will move to the next block.

(If the start signals are turned ON simultaneously, it will be performed in the order of A, B, and C.)



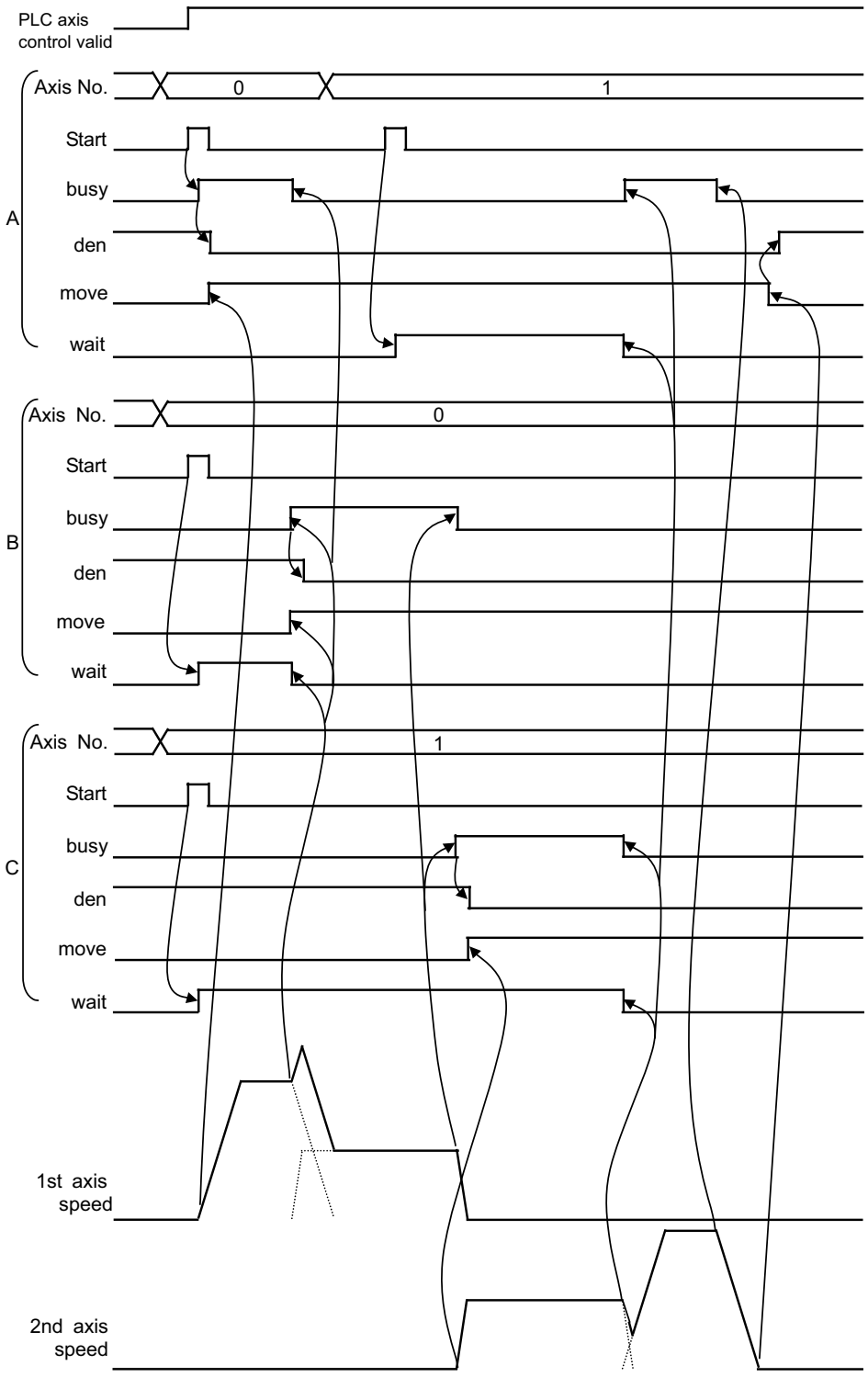
[Timing chart]

G1→G1→G0→G1 (Same axis)



(Note) Change and start the data after the busy signal turns OFF. Starting while the busy signal is ON will be ignored.

G0→G1→G1→G0 (Two axes)



[Caution]

Only one set of buffering mode can be commanded. When two or more sets are commanded simultaneously, the sets commanded later will cause an alarm.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	POWER CONSUMPTION COMPUTATION: ENABLE CONSUMPTION ACCUMULATION 1 to 4	IPCE1 to 4	Y724 to 7

[Function]

This signal enables "Consumption accumulation 1 to 4".

[Operation]

The following kinds of consumption accumulation are performed while this signal is ON.

- Accumulated consumption of entire drive system 1 to 4 (R122 to 9)
- Accumulated consumption of devices other than drive system 1 to 4 (R130 to 7)
- Total accumulated consumption 1 to 4
- Drive system's fixed consumption correction 1 to 4
- Accumulated consumption of servo axis in drive system (fluctuating part) 1 to 4
- Accumulated regeneration of servo axis in drive system (fluctuating part) 1 to 4
- Accumulated consumption of spindle in drive system (fluctuating part) 1 to 4
- Accumulated regeneration of spindle in drive system (fluctuating part) 1 to 4

[Related signals]

(1) Power consumption computation: Consumption accumulation ON 1 to 4 (IPCEI1 to 4:X700 to 3)
(2) Power consumption computation: Accumulated consumption of entire drive system 1 to 4 (DTIPC1 to 4:R122 to 9)
(3) Power consumption computation: Accumulated consumption of devices other than drive system 1 to 4 (NDIPC1 to 4:R130 to 7)
(4) Power consumption computation: Consumption of devices other than drive system (NDPC:R304, 5)
(5) Power consumption computation: Drive system's fixed consumption correction (DFPCC:R306, 7)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	CRT CHANGEOVER COMPLETION	CRTFN	Y728

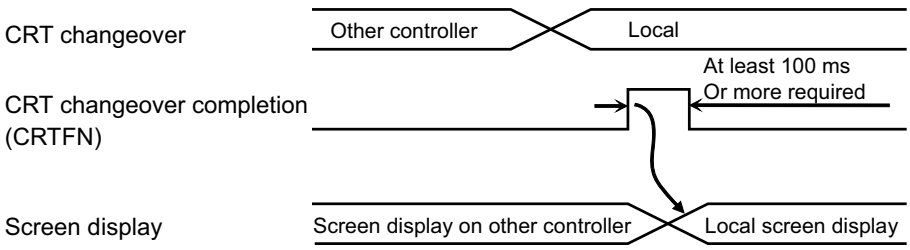
[Function]

When using one setting and display unit for multiple controller display units, this signal is used to inform the controller that it has been changed as a display unit.

[Operation]

When this signal turns ON, the currently selected screen will display at the rising edge. For the setting and display unit screen, the screen on the controller before the changeover will remain, so when this signal is input, the local screen display will be changed to.

[Timing chart]



Con-tact	Signal name	Signal abbreviation	Common for part systems
A	SCREEN DISPLAY REQUEST	SCRON	Y729

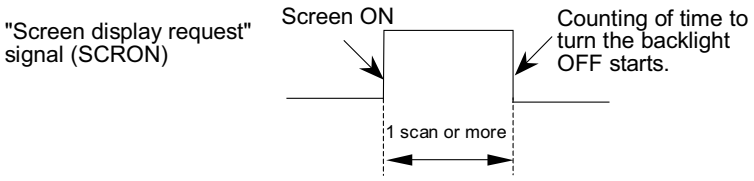
[Function]

The screen backlight, which was turned OFF with the screen saver function, can be turned ON again.

[Operation]

(1) The backlight is turned ON again when this signal turns ON. Counting of the time to turn the backlight OFF will start when this signal turns OFF.

(2) If this signal is output to the CNC while the screen is ON, counting of the time to turn the screen OFF will restart.



(Note 1) The backlight is not turned OFF with "#8078 Screen saver time" while the "Screen display request" signal is ON, but the backlight can be turned OFF using the and keys.

(Note 2) If the "Screen display request" signal (Y729) is changed again after that has changed once, intervals of 1scan or more must be taken.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	COLLECTING DIAGNOSIS DATA STOP		Y72B

[Function]

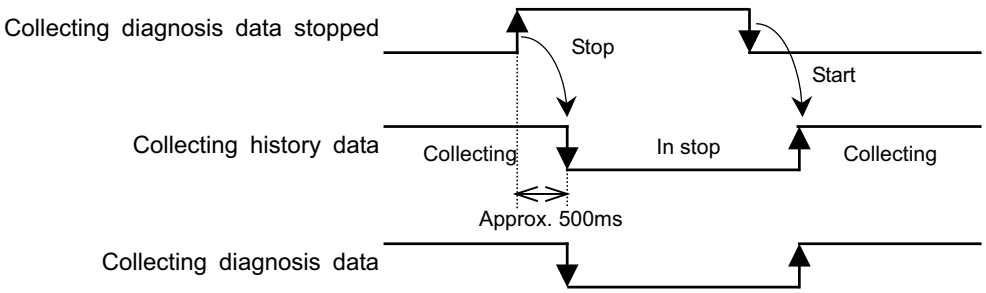
Data collection will be stopped by turning this signal ON while collecting history data using operation history function.
Data collection will be started (resumed) by turning the signal OFF in data stop mode.

[Operation]

(1) "Collecting diagnosis data stop" signal stops data collection during rising edge movement following the signal turned ON from OFF.
This signal starts data collection during falling edge movement following the signal turned OFF from ON.

(2) Data collection will be stopped when this signal is turned ON while executing diagnosis data collection (when "collecting diagnosis data" signal is turned ON). Data collection will be stopped in approx. 500ms after the signal is turned ON. "Collecting diagnosis data" signal is turned OFF when data collection is stopped.

(3) Data collection will be started when this signal is turned OFF while diagnosis data collection is stopped (when "collecting diagnosis data" signal is turned OFF). Data collection will be started in approx. 500ms after the signal is turned OFF. "Collecting diagnosis data" signal is turned ON when data collection is started.



(Note 1) This signal will be ignored even if issued at the first one scan after turning the power ON.

[Related signals]

(1) Collecting diagnosis data (X723)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	NC DATA SAMPLING TRIGGER	SMPTRG	Y72C

[Function]

The start and end of data sampling are controlled.

[Operation]

If PLC device is selected as the conditions for starting and ending data sampling, the start and end of data sampling will be controlled with this signal (Y72C). Note that if an arbitrary device is designated (#24) as the condition, the data sampling will start and end by turning the designated device ON and OFF.

The following parameters are set on the screen.

Name	Detail
Start condition	When this parameter is set to "2", the condition for starting data sampling is the PLC device ON (OFF when using B contact).
End condition	When this parameter is set to "2", the condition for ending data sampling is the PLC device OFF (ON when using B contact).
PLC-DEVICE	When start condition or end condition is set to "2", the device for controlling the start and end of data sampling is set.When this parameter is set to "0", the device for controlling the start and end of data sampling is the data sampling trigger (Y72C).

Con-tact	Signal name	Signal abbre-viation	Common for part sys-tems
A	PALLET PROGRAM REGISTRATION EXT. WORKPIECE COORDINATE TRANSFER READY		Y72F

[Function][Operation]

When transferring external workpiece coordinate offset (EXT) in the pallet 4 page registration, turn this signal ON. NC starts transfer processing at the rising edge of this signal.

When the external workpiece coordinate transfer completion signal is turned ON, turn this signal OFF.

It takes approx. 8ms from the start to the end of transfer processing. If the transfer completion signal is not turned ON even after 8ms has passed since the transfer ready signal was turned ON, reconsider the value of R register 4100 and 4102.

NC turns the external workpiece coordinate transfer completion signal OFF at the falling edge of this signal.

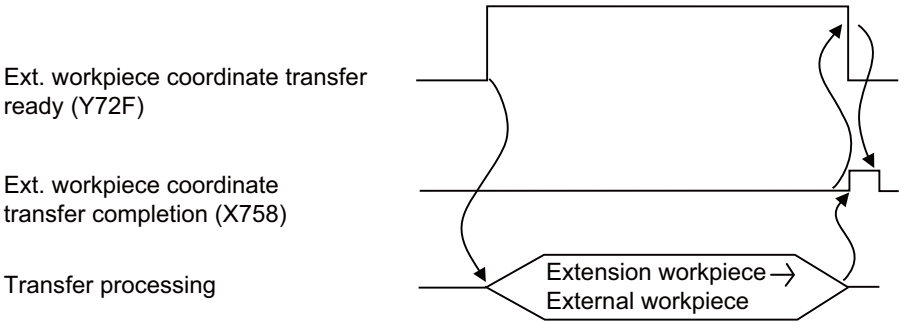
When turning the transfer ready signal ON from the machining program, recalculation request and M function finish (FIN1 or FIN2) must be turned ON after the external workpiece coordinate transfer completion signal is turned ON.

When recalculation is not requested, operation of the pre-read machining program will be carried out using the external workpiece coordinate offset prior to the change.

When M function has been completed before transfer is completed, the external workpiece coordinate offset data to be used in the machining program will not be changed from the one prior to the change until the transfer completion signal is turned ON.

This signal must be turned ON while the external workpiece coordinate transfer completion signal is OFF.

[Timing chart]


Ext. workpiece coordinate transfer ready (Y72F)
Ext. workpiece coordinate transfer completion (X758)
Transfer processing
Extension workpiece → External workpiece

[Related signals]

(1) Pallet program registration Ext. workpiece coordinate transfer completion (X758)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	DISPLAY CHANGEOVER $1 to $8	DISP1 to 8	Y730 to 7

[Function]

The displayed part system of the multiple part systems can be changed.

[Operation]

The displayed part system is changed at the rising edge of each display changeover signal.

The screen display for the multiple part systems is a screen for displaying one of the part systems. Thus, which part system to be displayed is determined by these signals.

If both of these signals are started up simultaneously, they will be invalid.

If "#11035 Sys. change limit" is set to "2", this signal will be invalid.

An example of the displayed part system change is as follows.

Example: When there are three effective part systems

	State A	→ State B	→ State C	→ State D	→ State E	→ State F
Y730($1)	0	0	0	0	0	0
Y731($2)	0	0	1	1	0	1
Y732($3)	0	1	1	0	0	1
Y733($4)	0	1	0	0	0	0
Y734($5)	0	0	0	0	0	0
Y735($6)	0	0	0	0	0	0
Y736($7)	0	0	0	0	0	0
Y737($8)	0	0	0	0	0	0
The state of display	Part system 1 is displayed (Note 1)	Change to Part system 3. (Note 2)	Part system 3 remains displayed.	Change to Part system 2.	Part system 2 remains displayed.	Part system 2 remains displayed. (Note 3)

(Note 1) If all signals are "0" at the time of power ON, part system 1 is displayed.

(Note 2) If a signal of any inactive part system is changed, the displayed part system is unchanged.

(Note 3) If a signal of two or more part systems are changed at a time, the displayed part system is unchanged.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	SINGLE BLOCK WITH PART SYSTEMS SYNCHRONIZED	MSBK	Y73A

[Function]

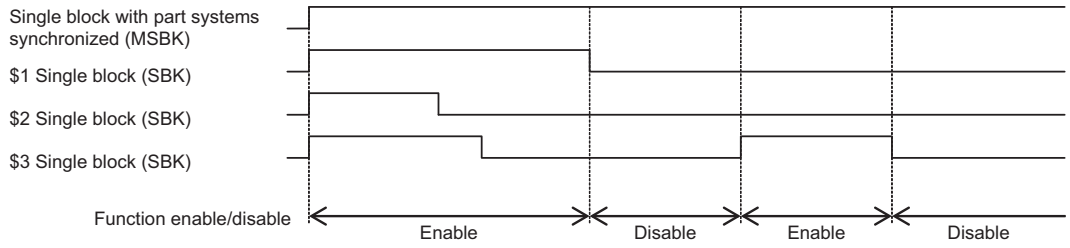
This signal enables the "Single block with part systems synchronized" operation.

In a multi-part system, this signal is used to perform single-block operation while keeping synchronization of part systems during operation that uses 2 or more part systems.

[Operation]

In a multi-part system in which single-block operation is performed while the "Single block with part systems synchronized" signal is ON, if single-block stop occurs in a part system, automatic operation pause occurs in other part systems.

This signal is enabled if any of the part systems is in single-block operation. If all part systems are in continuous operation, this signal is disabled.



[Related signals]

(1) Single block (SBK:YC12)

(2) Synchronization between part systems OFF (MSYNC:YCF8)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MANUAL ARBITRARY REVERSE RUN MODE	MORR	Y73C

[Function]

This signal enables manual arbitrary reverse run function.

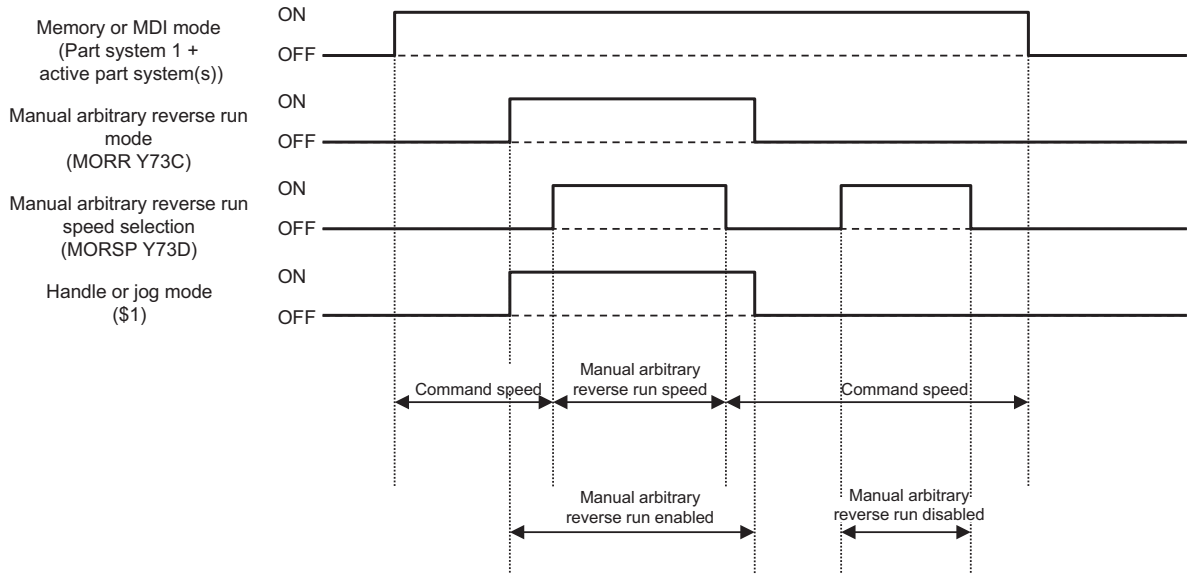
The manual arbitrary reverse run is performed by controlling the feedrate during automatic operation in the memory or MDI mode. The feedrate is controlled in proportion to the manual (jog) feed speed or manual rotation speed (handle).

[Operation]

The manual arbitrary reverse run is enabled only when the memory or MDI mode is entered and this signal is ON. The manual mode (handle or jog) must be turned ON at the same time as this signal turns ON, as the axis is moved in the manual mode (handle or jog) during the manual arbitrary reverse run.

Speed control during manual arbitrary reverse run is also enabled if the Manual arbitrary reverse run speed selection (MORSP) and Manual arbitrary reverse run speed multiplier (R379) is commanded.

[Operation sequence]



[Related signals]

(1) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)
(4) Manual arbitrary reverse run speed selection (MORSP:Y73D)
(5) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)
(6) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG:YCFC)
(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY YCF1)
(8) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MANUAL ARBITRARY REVERSE RUN SPEED SELEC-TION	MORSP	Y73D

[Function]

In speed control during manual arbitrary reverse run, this signal enables the program check speed constant.

[Operation]

When this signal is ON, the program check speed constant is used for speed control. When this signal is OFF, the command speed in the normal machining program is used.

The feedrate for manual arbitrary reverse run is controlled by the Manual arbitrary reverse run speed multiplier (R379) when operation is in jog mode. When in handle mode, the feedrate is controlled with the ratio of the handle pulses per time unit to "#19007 program check constant".

When this signal is OFF, the command speed in the normal machining program is used.

The speed used when the Manual arbitrary reverse run speed selection (MORSP) is ON

(1) When jog mode is selected:

Manual arbitrary reverse run speed = (Manual arbitrary reverse run speed multiplier ÷ Program check speed constant) × Command speed in the machining program

(2) When handle mode is selected:

Manual arbitrary reverse run speed = (Amount of change of the handle pulses per time unit ÷ Program check speed constant)

× Command speed in the machining program

- Rapid traverse override or cutting override can be exerted on the command speed in the machining program.
- Reverse motion is performed if the value of the manual arbitrary reverse run speed calculated with the above formula is a negative value.
- As the same rate of change of the manual arbitrary reverse run speed is applied to all part systems, synchronization of the part systems can be maintained. However, synchronization is not guaranteed when rapid traverse override or cutting override, which may cause a loss of synchronization, is used.
- If the value of the Manual arbitrary reverse run speed multiplier (R379) or the amount of change of handle pulses exceeds "#19007 program check constant", the value is clamped at "#19007 program check constant". The manual arbitrary reverse run speed never exceeds the command speed.

[Related signals]

(1) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)
(4) Manual arbitrary reverse run mode (MORR:Y73C)
(5) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)
(6) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG:YCFC)
(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY YCF1)
(8) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	HIGH-SPEED SIMPLE PROGRAM CHECK MODE	SMLK	Y73E

[Function]

This signal enables the high-speed simple program check function.

[Operation]

When this signal is enabled, the machining program is executed while all axes are in machine lock.
In this operation, the feedrate of the machining program changes according to the the value of High-speed simple program check: Time reduction coefficient (R378).

[Related signals]

(1) High-speed simple program check mode ON (SMLKO:X712)
(2) High-speed simple program check: Time reduction coefficient (R378)
(3) High-speed simple program check: Time measurement output (R372,373)

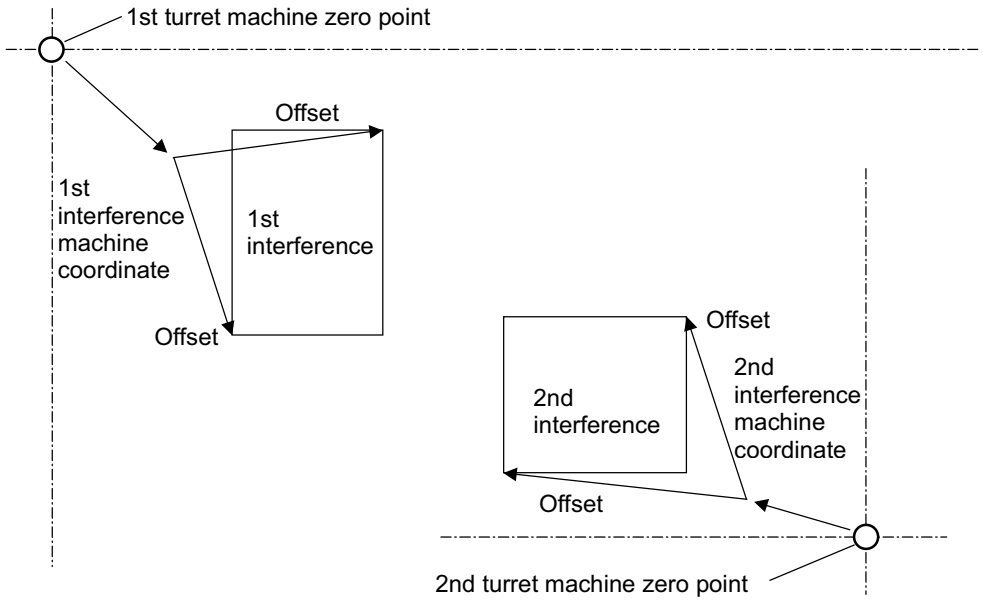
Con-tact	Signal name	Signal abbreviation	Common for part systems
A	INTERFERENCE CHECK VALID	CCHK	Y73F

[Function]

This signal constantly checks relative position of interference. When interfering, the signal validates a function that stops axis movement.

[Operation]

When the "interference check valid" signal (CCHK) is ON, command of the interference check is validated.



Con-tact	Signal name	Signal abbreviation	Common for part systems
A	TOOL IC NEW READ		Y740

[Function]

The tool information is read from the IC code chip, and registration of the tool starts.

[Operation]

When the rising edge (OFF to ON) of this signal is detected, a data send request is sent to the IC code reader. The received data is stored in the area corresponding to the tool No. in the received data.

The "in tool ID communication" signal is output while communicating with the IC code reader.

After the data is received, the received tool No. is stored in the pot No. designated in "Tool ID R/W pot No.".

(Note) This signal will be ignored even if it is turned ON during communication with the IC code reader.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Tool IC exchange read (Y741)
(2) Tool ID data erase (Y76F)
(3) Tool ID R/W pot No. (R336)
(4) In tool ID communication (X727)
(5) Tool ID communication error information (R62)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	TOOL IC EXCHANGE READ		Y741

[Function]

The tool information is read from the IC code chip, and updating of the tool information starts.

[Operation]

When the rising edge (OFF to ON) of this signal is detected, the tool information is read, and is compared with the tool No. stored in the pot No. If the numbers match, the tool information is updated.

If the numbers do not match, an error is output to "Tool ID communication error information".

The in "Tool ID communication" signal is output while communicating with the IC code reader.

(Note) This signal will be ignored even if it is turned ON during communication with the IC code reader.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Tool IC new read (Y740)
(2) Tool ID data erase (Y76F)
(3) Tool ID R/W pot No. (R336)
(4) In tool ID communication (X727)
(5) Tool ID communication error information (R62)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	CONTACTOR SHUTOFF TEST	MCT	Y742

[Function]

This signal carries out a contactor shutoff test.

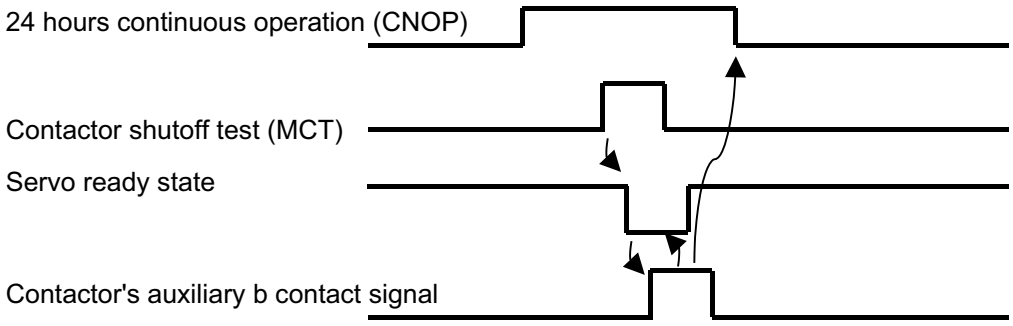
[Operation]

Send a "ready OFF" command to the drive unit at the contactor shutoff test signal's rising edge and shut the drive unit side contactor OFF. Then, turn the SDIO connector's SDO1 (contactor control output 1) output OFF and shut the NC side contactor OFF.

Confirm that the contactor's status is OFF by monitoring contactor's auxiliary b contact signal, then send a "ready ON" command to the drive unit to turn the drive unit side contactor ON. Turn ON the safety monitor connector output, then the NC side contactor. After that, turn the 24 hours continuous operation signal OFF.

If the contactor shutoff could not be confirmed within 5 seconds, "contactor welding detected" alarm is output and the status turns to the emergency stop.

[Timing chart]


24 hours continuous operation (CNOP)
Contactor shutoff test (MCT)
Servo ready state
Contactor's auxiliary b contact signal

[Caution]

Contactor shutoff test must be carried out when the drive power can be shut off without causing any problem.

Vertical axis requires brake circuit, etc. for a drop prevention.

[Related signals]

(1) 24 hours continuous operation (X752)

(2) Emergency stop cause (R69)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PLC SKIP 1 to 8		Y748 to F

[Function]

This is the skip input signal from the PLC.

[Operation]

This can be used for the skip related functions. (G31 skip, tool length measurement, etc.)

[Caution]

(1) The "PLC skip" signal is output to the skip input.

(2) When PLC skip is used, the coasting amount from the skip signal input will be slightly longer than the high speed skip.

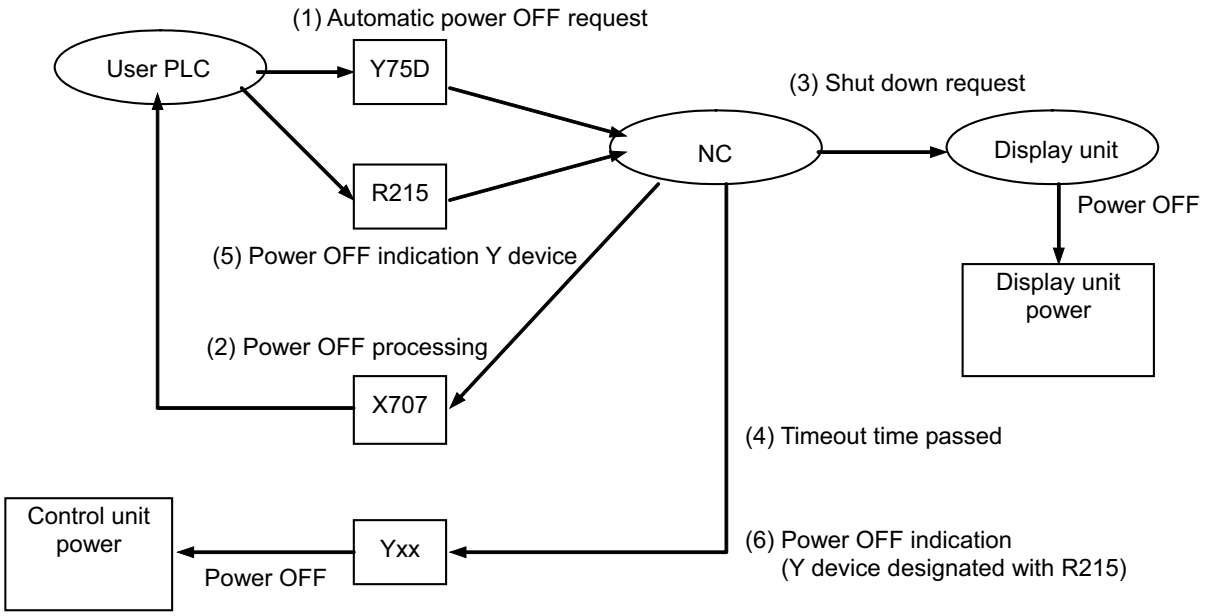
Con-tact	Signal name	Signal abbreviation	Common for part systems
A	AUTOMATIC POWER OFF REQUEST		Y75D

[Function]

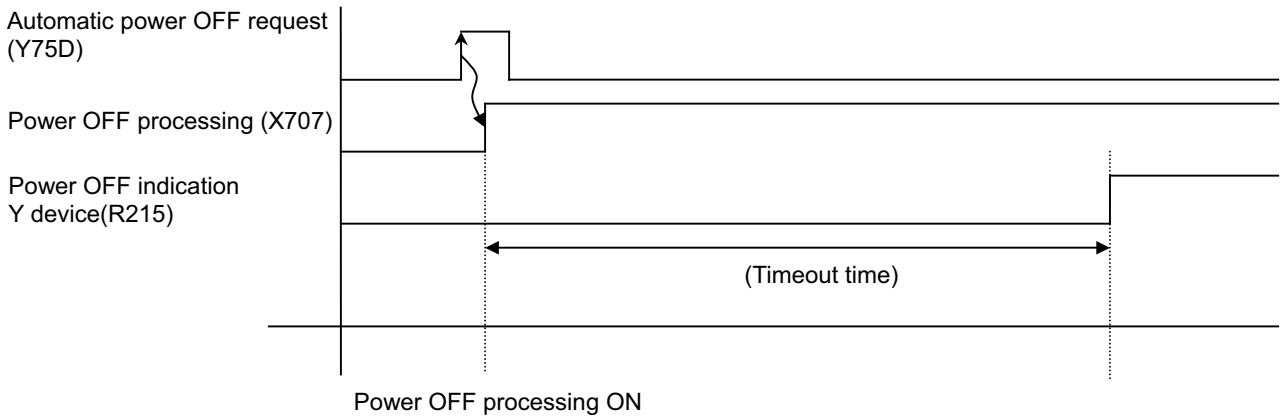
Automatic power OFF function notifies that the control unit's power can be turned OFF after shutting the display unit down by entering "automatic power OFF" signal from user PLC to NC.

[Operation]

(1) User PLC turns the "automatic power OFF request" signal ON.
(2) NC turns the "power OFF processing" signal ON.
(3) NC requests the display unit to be shut down.
(4) Timeout time is passed.
(5) The device has been specified by the "power OFF indication Y device No." signal.
(6) The specified device is turned ON.
When control unit and display unit use a different power supply, turn the control unit's power OFF after confirming the "power OFF indication Y device No." signal is turned ON.



[Timing chart]



[Caution]

(1) Time including the time required for HMI application termination and Windows shutdown has to be set in the machine parameter "#11007 PC Timeout".
(2) Normal power OFF processing is executed when the control unit's power is turned OFF during automatic power OFF processing.
(3) When an illegal IP address is set to the machine parameter "#11005 PC IP address", the PC on the network may be turned OFF.
(4) Do not execute the automatic power OFF function during editing or file I/O operation, etc.
(5) The automatic power OFF function is carried out to the display unit set to the machine parameter "#11005 PC IP address".
(6) During spindle rotation/traveling, execute automatic power OFF after stopping those spindle movements.

[Related signals]

(1) Power OFF processing (X707)
(2) Power OFF indication Y device No. (R215)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	ACTUAL CUTTING MODE (THREAD, TAP) IN MANUAL ARBITRARY REVERSE RUN	MRCMD	Y761

[Function]

This signal determines operation concerning the thread cutting and tapping blocks during manual arbitrary reverse run.

[Operation]

When this signal is ON, a block stop occurs before moving for thread cutting and tapping during manual arbitrary reverse run.
Also, execution of the thread cutting and tapping blocks is prevented when reverse run is performed.
If thread cutting during manual arbitrary reverse run is disabled, axes movement in the thread cutting and tapping blocks will be the same as other blocks.

[Related signals]

(1) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)
(4) Manual arbitrary reverse run mode (MORR:Y73C)
(5) Manual arbitrary reverse run speed selection (MORSP:Y73D)
(6) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG:YCFC)
(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY YCF1)
(8) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	ENCODER 1 ARBITRARY PULSE SELECTION		Y764
A	ENCODER 2 ARBITRARY PULSE SELECTION		Y765

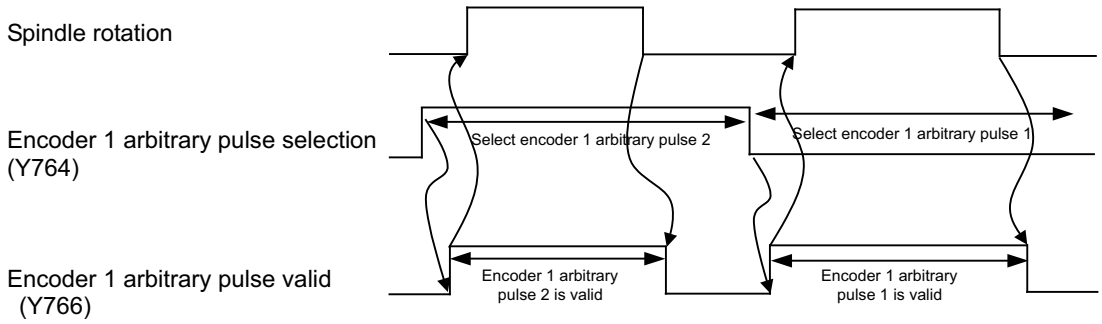
[Function]

These signals select encoder arbitrary pulse.

[Operation]

Device No.	Signal name	Details
Y764	ENCODER 1 ARBITRARY PULSE SELECTION	Select arbitrary pulse input 1 and 2 set in R register when entering arbitrary pulse with encoder input 1. 0: Encoder 1 arbitrary pulse 1 1: Encoder 1 arbitrary pulse 2
Y765	ENCODER 2 ARBITRARY PULSE SELECTION	Select arbitrary pulse input 1 and 2 set in R register when entering arbitrary pulse with encoder input 2. 0: Encoder 2 arbitrary pulse 1 1: Encoder 2 arbitrary pulse 2

[Timing chart]


Spindle rotation
Encoder 1 arbitrary pulse selection (Y764)
Encoder 1 arbitrary pulse valid (Y766)
Select encoder 1 arbitrary pulse 2
Select encoder 1 arbitrary pulse 1
Encoder 1 arbitrary pulse 2 is valid
Encoder 1 arbitrary pulse 1 is valid

[Caution]

Switching each encoder's arbitrary pulse selection (Y764 and 765) must be carried out during the spindle stop.

[Related signals]

(1) Encoder 1 arbitrary pulse valid (Y766)
(2) Encoder 2 arbitrary pulse valid (Y767)
(3) Encoder 1 arbitrary pulse 1 (R456)
(4) Encoder 1 arbitrary pulse 2 (R457)
(5) Encoder 2 arbitrary pulse 1 (R458)
(6) Encoder 2 arbitrary pulse 2 (R459)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	ENCODER 1 ARBITRARY PULSE VALID		Y766
A	ENCODER 2 ARBITRARY PULSE VALID		Y767

[Function]

These signals select valid/invalid for encoder arbitrary pulse.

[Operation]

Device No.	Signal name	Details
Y766	ENCODER 1 ARBITRARY PULSE VALID	Select valid/invalid for arbitrary pulse with the encoder input 1. 0: Invalid (conventional 1024 pulse fixed input) 1: Valid (arbitrary pulse input)
Y767	ENCODER 2 ARBITRARY PULSE VALID	Select valid/invalid for arbitrary pulse with the encoder input 2. 0: Invalid (conventional 1024 pulse fixed input) 1: Valid (arbitrary pulse input)

Turn OFF the arbitrary pulse valid signal when using the conventional 1024 pulse encoder.

[Caution]

Turning ON/OFF the encoder arbitrary pulse valid (Y766 and Y767) of the each encoder must be carried out during the spindle stop.

[Related signals]

(1) Encoder 1 arbitrary pulse selection (Y764)
(2) Encoder 2 arbitrary pulse selection (Y765)
(3) Encoder 1 arbitrary pulse 1 (R456)
(4) Encoder 1 arbitrary pulse 2 (R457)
(5) Encoder 2 arbitrary pulse 1 (R458)
(6) Encoder 2 arbitrary pulse 2 (R459)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	DOOR OPEN I	DOOR1	Y768

[Function]

This signal stops all axes, and cuts OFF contactor power.

[Operation]

The NC carries out the following operations when the "Door open I" signal turns ON.

(1) A deceleration stop is carried out for all axes (servo axes and spindles).
(2) A ready OFF state occurs after all axes stop, and the contactor power of each drive unit is cut OFF.
(3) The "Door open enable" signal turns ON.

The NC carries out the following operations when the "Door open I" signal turns OFF.

(1) A ready ON and servo ON state occurs for all axes.
(2) The "Door open enable" signal turns OFF.

[Caution]

(1) Handling of the PLC axis
Set so a "Door open I" signal is output to the NC after the PLC axis is stopped by the PLC.
If a "Door open I" signal is input without stopping the PLC axis, the axis will stop with a dynamic brake method due to the ready OFF state.

(2) Handling of the analog spindle
When an analog spindle is connected, it is not possible to confirm that the spindle has completely stopped with the NC. Thus, confirm that the spindle has completely stopped using the PLC, before opening the door. Because the spindle may start rotating again immediately after the door is closed, for safety turn the forward run and reverse run signals OFF when the door is open.

(3) Opening the door during ATC operation
When opening the door during ATC operation, apply an interlock with the user PLC.

[Related signals]

(1) Door open enable (DROPNS:XCD8)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	HIGH-SPEED SIMPLE PROGRAM CHECK: ENABLE CO-ORDINATE POSITION CHECK	SPSC	Y76B

[Function]

This signal enables the following check when NC reset is input during high-speed simple program check: difference check for the workpiece coordinate position and command machine coordinate position at the beginning of the machining program and at NC reset input.

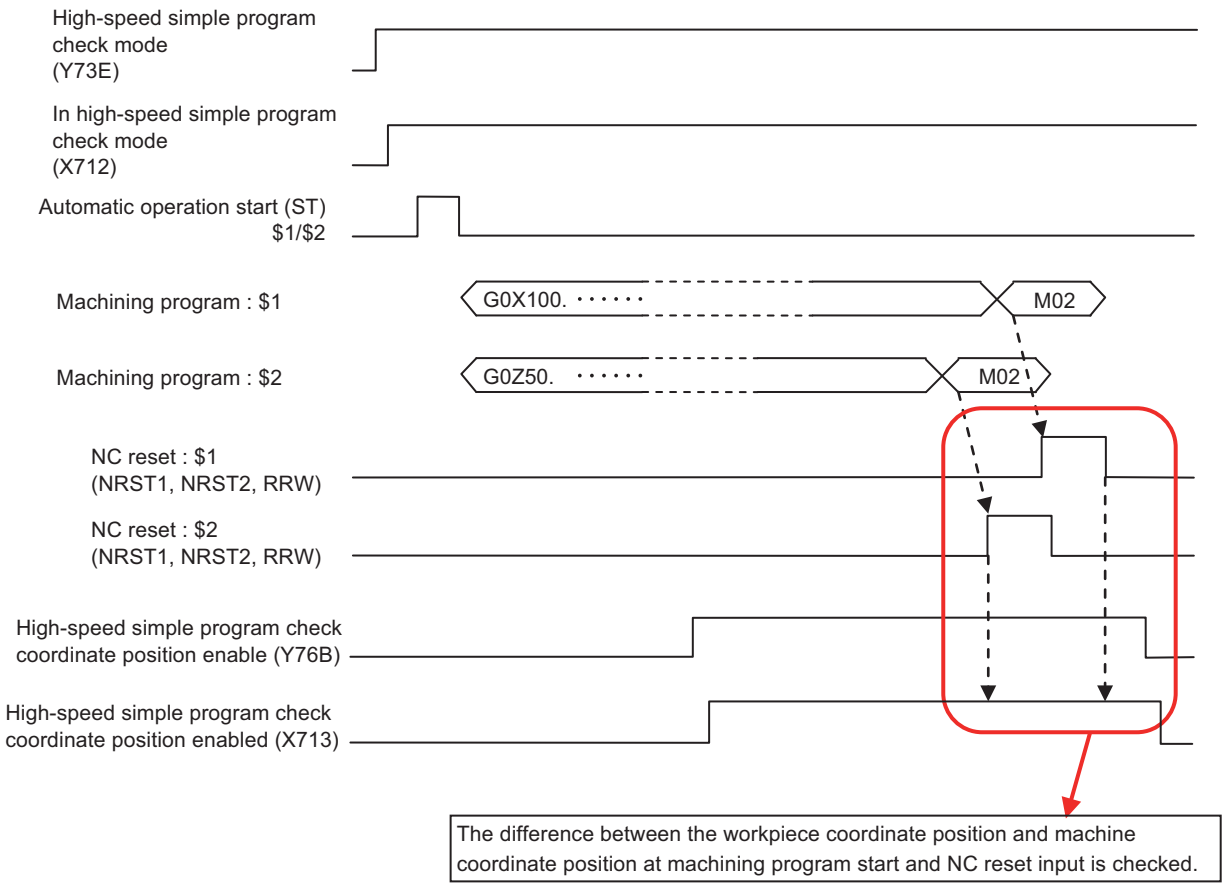
[Operation]

If the following conditions are met, the workpiece coordinate position and command machine coordinate position at the beginning of the machining program are compared with these positions at NC reset input: this signal is turned ON during high-speed simple program check and NC reset is input while the "High-speed simple program check: Coordinate position check ON" signal (X713) is ON.

If any difference is detected, an operation error occurs.

This check is performed only for the following axes: the axes for which workpiece coordinate position/ command machine coordinate position checks are enabled with parameters "#8226 work position check" and "#8227 machine position check".

[Timing chart]


High-speed simple program check mode (Y73E)
In high-speed simple program check mode (X712)
Automatic operation start (ST) $1/$2
Machining program : $1
G0X100. ·····
M02
Machining program : $2
G0Z50. ·····
M02
NC reset : $1 (NRST1, NRST2, RRW)
NC reset : $2 (NRST1, NRST2, RRW)
High-speed simple program check coordinate position enable (Y76B)
High-speed simple program check coordinate position enabled (X713)
The difference between the workpiece coordinate position and machine coordinate position at machining program start and NC reset input is checked.

[Related signals]

(1) High-speed simple program check mode (SMLK:Y73E)

(2) High-speed simple program check mode ON (SMLKO:X712)

(3) High-speed simple program check: Coordinate position check ON (SPSCO:X713)

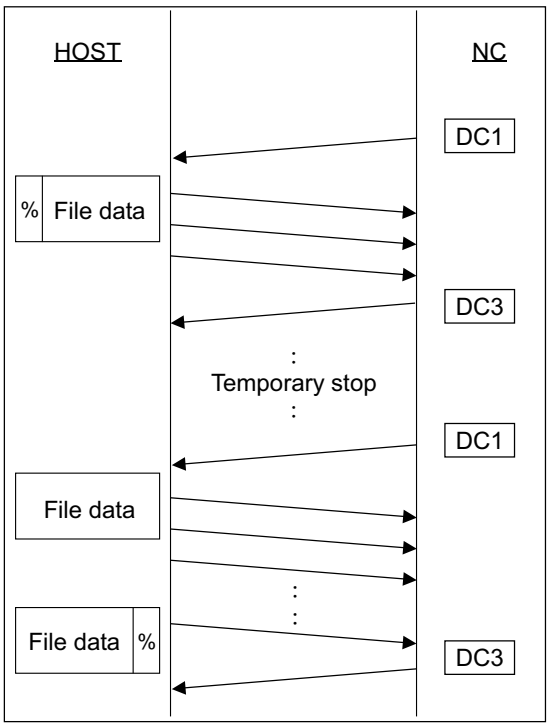
Con-tact	Signal name	Signal abbreviation	Common for part systems
A	REMOTE PROGRAM INPUT START		Y76C

[Function]

With this "remote program input start" signal, machining program can be input from a personal computer, etc.

[Operation]

The remote program input communicates in Xon/Xoff control (DC code method) between a personal computer, etc. (hereinafter called HOST) and NC.

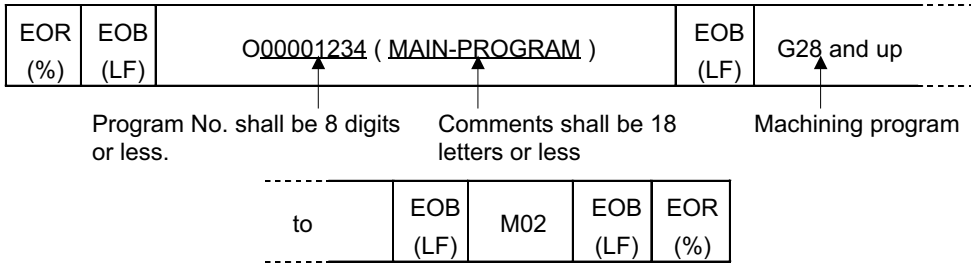


List of transmission control code

Control code	Code	Meaning
DC1	11H	Commands transfer start and temporary stop release to the HOST
DC3	13H(93H)	Commands transfer temporary stop to the HOST

(Note) The code of DC3 switches, depending on the setting of the DC code parity. (Parity valid:93H, Parity invalid:13H)

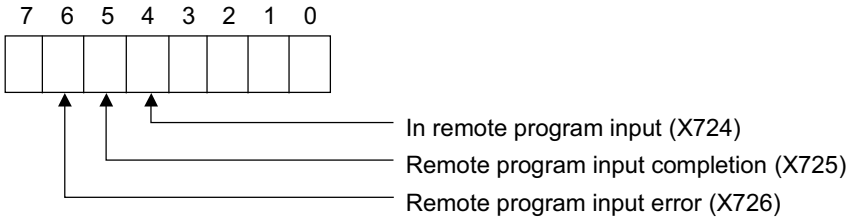
File data



The format is same as conventional input/output data (machining program).
The program No. and comments are not always necessary. When the program No. omitted, remote program input No. described later will be input.

(1) Remote program input start (Y76C)
This signal is for starting remote program input. When the signal is turned ON, NC sends DC1.

(2) Status (X724, X725, X726)
Status of remote program input is indicated. The status is set by NC and checked by PLC.



(3) Remote program input No. (R352[L]/R353[H])
If no program No. is found in the machining program, value in R352/R353 will be input as program No. However, if the value is "0", an error will occur.
If program No. is found in the machining program, the value in R352/R353 will be changed to that program No.

(4) Remote program input error information (R30)

When an error occurs, an error value will be set in the remote program input error information (R30) and saved till the next start.

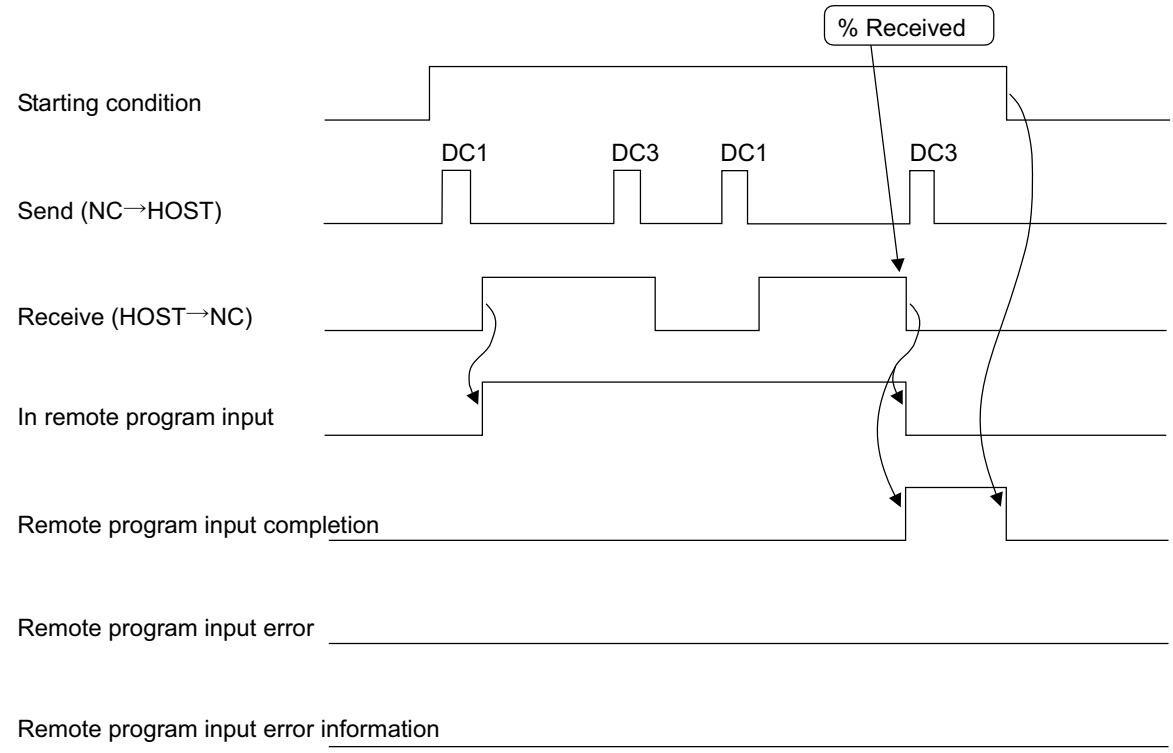
The error information will be cleared on NC side at the rising edge of a trigger signal.

Error No.(HEX)	Error name	Details
04,22	Memory capacity over	Cannot input because the memory capacity will be exceeded
06	Number of programs registered over	Attempted to input machining program exceeding number specified in the specification
08,26	No applicable program	Program designated does not exist in the memory
09	Edit lock B	Attempted to input in respect to the inhibited machining program B
0A	Edit lock C	Attempted to input in respect to the inhibited machining program C
20	Delete error	Attempted to delete opened file
25	Write protect error	File is write-protected
33	Over run error	Over run error occurred
35	Parity H error	Character code is not ISO code
3D	Reset and finished	Input was forcibly terminated by reset signal(DC3 will not be sent after reset and finished)
40	Timeout finish	After the input start, input data was not received after set "time out time" of I/O parameters passed
48	No program No.	Machining program cannot be registered because program No. is not set in R352/R353 and not found in the machining program input by NC
49	In program operation	Attempted to overwrite on the machining program in operation
4C	No option	Remote program input function is not added as an option(When no-option error occurred, no communication is performed at all)
52	Input/Output not available	Attempted to input new remote program while another input/output function is running
54	Input data illegal	Machining program cannot be registered because there is no EOB in the machining program input by NC.
57	Label No. error	Program No. in the input program is not correct

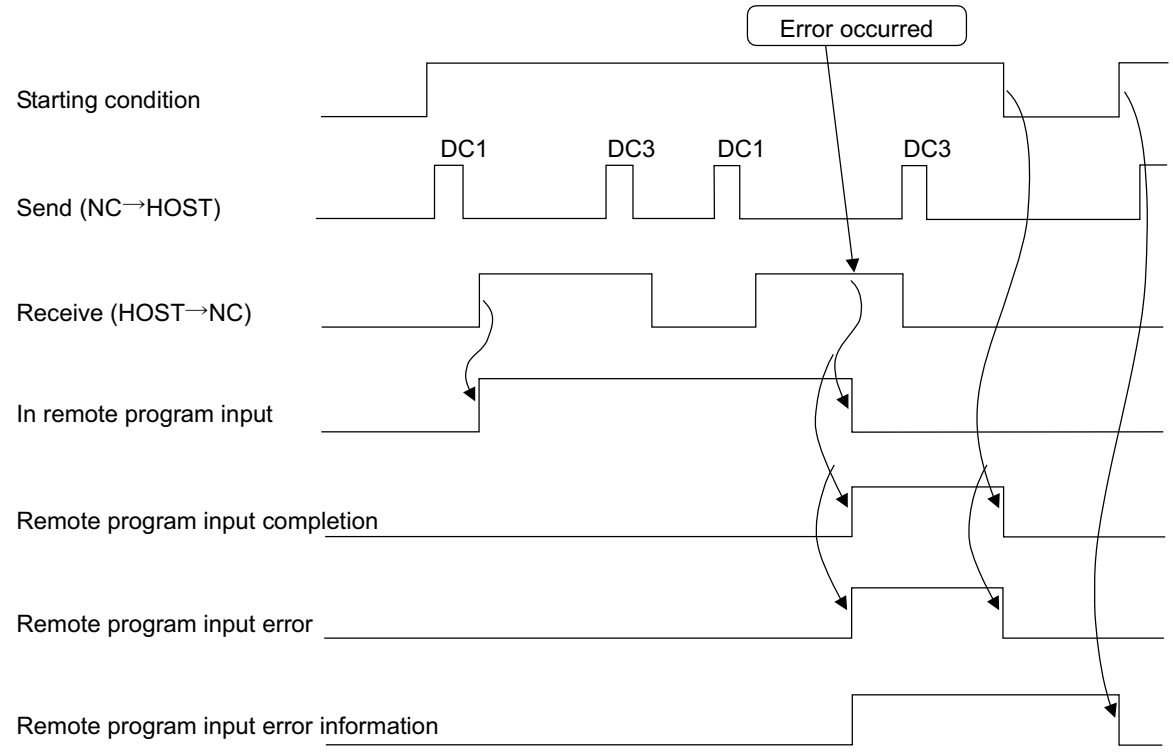
(Note) Program No. duplication error will not occur. When same number is found, it will be overwritten.

[Timing chart]

Case of normal completion



Case of input error completion



When an error occurred, turn OFF the "in input" signal and turn ON the "input completion" signal and "input error" signal.DC3 will be sent when % is received after error occurred or when reception buffer of NC is full.

[Caution]

(1) The remote program input can be canceled by the reset signal.
(It will be an error completion "reset and finished".)

(2) Remote program input and normal input/output (I/O on NC side input screen) cannot be performed simultaneously. The one started first will be prioritized.
If normal input/output is started in remote program input mode, an error message "E84 CAN'T IN/OUT" will be displayed and the normal input/output would not be performed. If remote program input is started in normal input/output mode, it will be an error completion "input/output not available".

(3) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) In remote program input (X724)
(2) Remote program input completion (X725)
(3) Remote program input error (X726)
(4) Remote program input error information (R30)
(5) Remote program input No. (R352,R353)

Contact	Signal name	Signal abbreviation	Common for part systems
A	TOOL ID DATA READ		Y76D

[Function]

This signal starts reading of the tool information from the tool ID label.

[Operation]

When the rising edge (OFF to ON) of this signal is detected, transmission of data is requested to the tool ID controller. The received data is stored in the area corresponding to the tool No. in the reception data.
The "In tool ID communication" signal (X727) is output when communicating with the tool ID controller.
After the data is received, the received tool No. is stored in the pot No. designated by R336.

[Caution]

(1) This signal will be ignored even if it is turned ON during tool ID communication.
(2) This signal is prepared for a specific machine tool builder.

Contact	Signal name	Signal abbreviation	Common for part systems
A	TOOL ID DATA WRITE		Y76E

[Function]

This signal starts writing of the tool information to the tool ID label.

[Operation]

When the rising edge (OFF to ON) of this signal is detected, the tool information corresponding to the tool No. stored in the pot No. designated by R336 is sent to the tool ID controller.
The "In tool ID communication" signal (X727) is output when communicating with the tool ID controller.

[Caution]

(1) This signal will be ignored even if it is turned ON during tool ID communication.
(2) This signal is prepared for a specific machine tool builder.

Contact	Signal name	Signal abbreviation	Common for part systems
A	TOOL ID DATA ERASE		Y76F

[Function]

This signal erases the tool information stored in the CNC.

[Operation]

When the rising edge (OFF to ON) of this signal is detected, the tool information corresponding to the tool No. stored in the pot No. designated by R336 is erased, and the pot No. tool No. is set to "0".

[Caution]

(1) This signal will be ignored even if it is turned ON during tool ID communication.
(2) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PLC AXIS CONTROL VALID n-TH AXIS	PLCAEn	Y770 to 5

[Function]

PLC axis control process is executed with the control information data while the PLC axis control valid signal is ON.

[Operation]

When turning ON the PLC axis control valid signal, designate with the following device.

Device No.	Signal name
Y770	PLC axis control valid 1st axis
Y771	PLC axis control valid 2nd axis
Y772	PLC axis control valid 3rd axis
Y773	PLC axis control valid 4th axis
Y774	PLC axis control valid 5th axis
Y775	PLC axis control valid 6th axis

(Note) Reset state is activated when the PLC axis control valid signal is turned OFF.

[Related signals]

(1) PLC axis control buffering mode valid (PABMI:Y723)

(2) PLC axis control information address (R440 to R443)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION VALID	GBON	Y778

[Function]

This signal enables the Guide bushing (G/B) spindle synchronization function.

[Operation]

The spindle synchronization state is entered by turning ON this signal.

[Related signals]

(1) G/B spindle synchronizing mode (GBMOD:X778)

(2) G/B spindle synchronization: position control synchronizing (GBSYN:X779)

(3) G/B spindle synchronization: phase shift amount (R466)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: PHASE ALIGNMENT	GBPHS	Y77A

[Function]

This signal aligns the phase (relative position) of the rotating reference spindle and the guide bushing (G/B) spindle.

[Operation]

When this signal is ON, and when the reference spindle and the guide bushing spindle are in the synchronous state (the G/B spindle synchronization signal is ON) and also when they are in the steady rotation state, a phase alignment of the reference spindle and the G/B spindle is carried out targeting the phase gap (relative position) between the reference spindle and the G/B spindle that have been saved by the G/B spindle synchronization phase memory (GBPHM).

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)

(2) G/B spindle synchronization: phase memory (GBPHM:Y77B)

(3) G/B synchronization: phase alignment complete (GBPHF:X77A)

(4) Spindle up-to-speed (USO: X188D)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: PHASE MEMORY	GBPHM	Y77B

[Function]

This signal saves the phase gap (relative position) between the reference spindle and the guide bushing (G/B) spindle in the NC.

[Operation]

Rotate the reference spindle and the guide bushing spindle by one revolution or more (until the Z phase is passed) in synchronous state (the G/B spindle synchronization valid (GBON) ON) then stop them. After both of them stop, the NC saves the phase gap (relative position) at the rising edge of this signal.

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)
(2) Z phase passed (SZPH:X1895)
(3) Zero speed (ZSO:X188C)
(4) G/B spindle synchronization: phase shift amount (R466)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: POSITION ERROR COMPENSATION	GBCMON	Y77C

[Function]

This signal carries out compensation by finding the position error compensation amount based on the position error of the reference spindle and the guide bushing (G/B) spindle caused by a square bar’s torsion.

[Operation]

When this signal is turned ON, the position error compensation amount of the reference spindle and the guide bushing spindle is found, and the guide bushing spindle synchronization position error compensation starts.

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)
(2) G/B spindle synchronization: keep position error compensation amount signal (GBCMKP:Y77E)
(3) G/B spindle synchronization: position error compensation scale and the number of times of compensations (R390)
(4) G/B spindle synchronization: position error compensating (GBPCM:X77B)
(5) G/B spindle synchronization: position error compensation amount (R465)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: TEMPORARY CAN-CEL	GBOFF	Y77D

[Function]

The reference spindle and the guide bushing (G/B) spindle can be controlled independently by temporarily canceling the guide bushing spindle synchronization using this signal.

[Operation]

ON: Guide bushing spindle synchronization temporarily canceled

OFF: Guide bushing spindle synchronization can be enabled

The following signals are disabled when this signal is ON, and they are enabled when this signal is OFF.

- Y778 (G/B spindle synchronization valid)
- Y77A (G/B spindle synchronization: phase alignment)
- Y77B (G/B spindle synchronization: phase memory)
- Y77C (G/B spindle synchronization: position error compensation)
- Y77E (G/B spindle synchronization: keep position error compensation amount)

Operation error "M01 GB SP sync:Cancel sgnl illegal 1137" occurs if this signal is turned ON/OFF when the reference spindle or the guide bushing spindle is in any of the following modes.

- During rotation (when not stopped)
- During tap cycle synchronization mode
- During spindle synchronization mode/tool-spindle synchronization I (polygon machining) mode/tool-spindle synchronization II (hobbing) mode
- During spindle C axis control C axis mode
- During orientation/indexing

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: KEEP POSITION ER-ROR COMPENSATION AMOUNT SIGNAL	GBCMKP	Y77E

[Function]

Select whether to cancel or hold the guide bushing (G/B) spindle synchronization position error compensation execution state when the G/B spindle synchronization: position error compensation (GBCMON) is OFF.

[Operation]

- OFF: Position error compensation execution state is canceled
  (The guide bushing spindle returns to the position before compensation. The guide bushing spindle synchronization position error compensation execution state is canceled.)
- ON: Position error compensation execution state is held
  (The guide bushing spindle does not return to the position before compensation. The guide bushing spindle synchronization position error compensation execution state is held.)

[Related signals]

(1) G/B spindle synchronization valid (Y778)
(2) G/B spindle synchronization: position error compensation (GBCMON:Y77C)
(3) G/B spindle synchronization: position error compensation scale and the number of times of compensations (R390)
(4) G/B spindle synchronization: position error compensating (GBPCM:X77B)
(5) G/B spindle synchronization: position error compensation amount (R465)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	CONTROL AXIS DETACH n-TH AXIS	DTCH1 to 8	Y780 to 7	Y788 to F	Y790 to 7	Y798 to F

[Function]

Desired control axis can be specified to be exempted from control function.

Each control axis is provided with this signal. The last numeric of signal name indicates axis No. to be detached.

DTCHn
- 1 ..... 1st axis is detached
- :
- :
- 8 ..... 8th axis is detached

[Operation]

When "Control axis detach" signal (DTCHn) turns ON, the corresponding axis is exempted from control.

(1) Specified axis is not under any positioning control (oriented spindle stop, index, etc.)

(2) "Servo alarm", "Stroke end alarm" and other alarms are not applied to specified axis.

(3) Interlock signal applied to specified axis is deemed to be ON.

(4) Specified axis is displayed by the setting and display unit.

(Note 1) The same function can be used by setting parameter on the setting and display unit. (See below)

The control axis detach is valid when the following are valid:

Basic specification parameter "#1070 axoff" (axis detach), and control axis detach n-th axis(DTCHn)

or

Basic specification parameter "#1070 axoff" (axis detach), and axis parameter of machining parameter "#8201 AX. RELEASE"

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
B	SERVO OFF n-TH AXIS	*SVF1 to 8	Y7A0 to 7	Y7A8 to F	Y7B0 to 7	Y7B8 to F

[Function]

Control axis (axis motion under control) can be set to "Servo OFF" (i.e., servo motor remains still).
In servo OFF condition, positioning control is impossible but the position detect function is alive.
Each control axis is provided with this signal. The last number (n = 1, 2, 3...) of the signal abbreviation indicates the control axis No.

[Operation]

When "Servo OFF" signal (*SVFn) turns OFF, the corresponding control axis is set to servo OFF condition.
Whether displacement which was caused during servo OFF by external force is corrected when "Servo ON" signal is given, or not, can be determined by setting parameter. (#1064 svof Error correction)

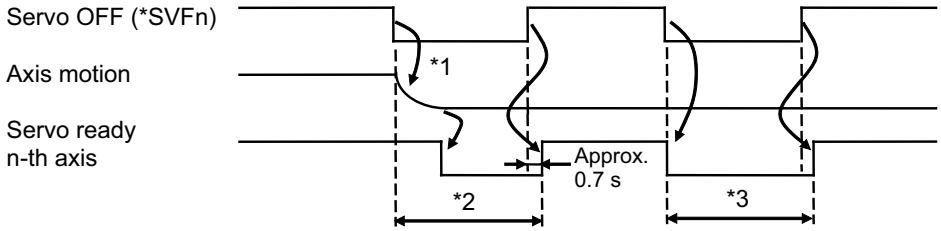
(1) When displacement is corrected (follow-up):

- An amount of motion equal to the displacement is commanded so that positioning error becomes zero.
- In this case, machine position remains deviated from in-position when "Servo OFF" signal is restored. The current position read by position counter is corrected and the machine position is corrected when the next absolute motion command is given ("Manual absolute" (ABSn) signal is turned ON when manual operation is selected).

(2) When displacement is not corrected:

- In this case, machine position should be corrected when "Servo OFF" signal is restored.

(Example) Servo-OFF during motion



*1: Servo turns OFF after deceleration and stopping during axis motion.
*2, 3: Controller internal interlock by servo OFF (axis motion not possible)

[Caution]

These signals are all handled as B contacts.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	MIRROR IMAGE n-TH AXIS	MI1 to 8	Y7C0 to 7	Y7C8 to F	Y7D0 to 7	Y7D8 to F

[Function]

This signal is used to machine a symmetrical shape by reversing the sign for the movement amount per block.
Each control axis is provided with this signal. The last number of signal name indicates No. of control axis.

M I n

1: Mirror image is applied ON 1st axis.
:
:
8: Mirror image is applied ON 8th axis.

[Operation]

Symmetrical cutting is enabled by reversing the sign of the value commanded for memory or MDI operation.

(1) Regardless of whether the coordinate is commanded with an incremental mode or absolute mode, the mirror image is applied ON the incremental amount to be executed for all axes that can be controlled.

(Note) The mirror image is changed after block stop.

[Related signals]

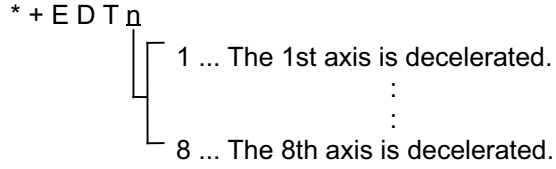
(1) In mirror image n-th axis (MIR1 to 8: X9C7 to F)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
B	EXTERNAL DECELERATION+ n-TH AXIS	*+EDT1 to 8	Y7E0 to 7	Y7E8 to F	Y7F0 to 7	Y7F8 to F

[Function]

The feedrate when the control axis is moving in the + direction can be controlled while this signal (*+EDTn) is OFF, at a constant speed set with the parameters.

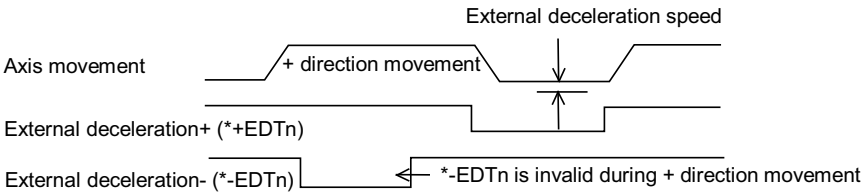
This signal is present for each control axis. The end numbers in the signal name indicate the control axis No.



[Operation]

During manual mode when the "External deceleration" signal (*+EDTn) turns OFF, each axis decelerates independently. However, during automatic mode, all axes will decelerate at the same deceleration speed when even one axis matches the external deceleration conditions. The deceleration occurs when the movement axis direction matches the "External deceleration" signal direction of the corresponding axis.

(1) The external deceleration speed can be randomly set with the parameters. (#1216 extdcc)
(2) When the speed is less than the external deceleration speed, it will not be affected even if this signal is OFF.
(3) The deceleration speed during automatic operation will be the combined deceleration speed, if the deceleration conditions match and the external deceleration speed is exceeded.
(4) When returning in the reverse direction, the speed will immediately return to the correct command speed.
(5) For G28, G29 and G30 commands, the speed will become the external deceleration speed for that axis only, even in automatic operation.
(6) The speed will become the external deceleration speed even in rapid traverse during synchronous tapping.



[Caution]

(1) The external deceleration signal is handled as a B contact (*) signal, but changes to 1 (ON) when the power is turned ON. When not being used, it is not necessary be concerned with external deceleration when programming.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
B	EXTERNAL DECELERATION- n-TH AXIS	*-EDT1 to 8	Y800 to 7	Y808 to F	Y810 to 7	Y818 to F

[Function][Operation]

The functions and operations of this signal are the same as those of "External deceleration+ n-th axis" signal (*+EDTn). The deceleration occurs when the movement is in the minus direction and the "External deceleration- n-th axis" signal (*-EDTn) is OFF.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
B	AUTOMATIC INTERLOCK+ n-TH AXIS	*+AIT1 to 8	Y820 to 7	Y828 to F	Y830 to 7	Y838 to F

[Function]

All axis motions of machine can be decelerated and stopped immediately during automatic operation when motion of a specific axis (n-th axis) in plus direction activates the interlock function.

These signals are for each control axis, and the number at the end of the signal name indicates the control axis No.

*+AITn
- 1 ..... Automatic interlock+ 1st axis
- :
- 8 ..... Automatic interlock+ 8th axis

[Operation]

When this signal turns OFF for a specific axis in motion in the plus direction under automatic operation mode (memory, MDI, tape), motion of all axis decelerates and stops with "M01 operation error code 004" displayed.

With this signal set OFF from the beginning, the system completes calculation for axis motion but makes it remain stopped with the same operation error code displayed. In either case, setting the signal ON resumes or starts axis motion.

[Caution]

(1) All automatic interlock signals are for B contact.

(2) The "Automatic interlock" signal is set to 1 when the power is turned ON, so an interlock cancel state in the sequence program does not need to be created for the axis not being used.

[Related signals]

(1) Automatic interlock- n-th axis (*-AITn: Y840)

(2) Manual interlock+/- n-th axis (*+/-MITn: Y860/Y880)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
B	AUTOMATIC INTERLOCK- n-TH AXIS	*-AIT1 to 8	Y840 to 7	Y848 to F	Y850 to 7	Y858 to F

[Function][Operation]

The details are the same as the "Automatic interlock+ n-th axis" signal, except that the direction is opposite.

The "Automatic interlock+ n-th axis" signal is valid for the axis moving in the plus direction, and this signal is valid for the axis moving in the minus direction.

These signals are for each control axis, and the number at the end of the signal name indicates the control axis No.

*-AITn
- 1 ..... Automatic interlock- 1st axis
- :
- 8 ..... Automatic interlock- 8th axis

[Related signals]

(1) Automatic interlock+ n-th axis (*+AITn: Y820)

(2) Manual interlock+/- n-th axis (*+/-MITn: Y860/Y880)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
B	MANUAL INTERLOCK+ n-TH AXIS	*+MIT1 to 8	Y860 to 7	Y868 to F	Y870 to 7	Y878 to F

[Function]

When the corresponding axis is moving in the plus direction with manual operation (jog, manual, incremental, reference position return), only the corresponding axis can be decelerated and stopped by turning OFF this signal that corresponds to that axis.

These signals are for each control axis, and the number at the end of the signal name indicates the control axis No.

*+MITn
- 1 ..... Manual interlock+ 1st axis
- :
- :
- 8 ..... Manual interlock+ 8th axis

[Operation]

When this signal turns OFF (0) for a specific axis in motion in the plus direction under manual operation mode (jog, handle, incremental, reference position return), motion of the axis decelerates and stops with NC alarm "M01 OPERATION ERROR 0004" displayed.

With this signal set OFF from the beginning, the system completes calculation for axis motion but makes it remain stopped with the same operation error code displayed. In either case, setting the signal ON (1) resumes or starts axis motion.

[Caution]

(1) All interlock signals are for B contact.

(2) The "Manual interlock" signal is set to 1 when the power is turned ON, so an interlock cancel state in the sequence program does not need to be created for the axis not being used.

[Related signals]

(1) Manual interlock- n-th axis (*-MITn: Y880)

(2) Automatic interlock+/- n-th axis (*+/-AITn: Y820/Y840)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
B	MANUAL INTERLOCK- n-TH AXIS	*-MIT1 to 8	Y880 to 7	Y888 to F	Y890 to 7	Y898 to F

[Function][Operation]

The details are the same as the "Manual interlock+ n-th axis" signal, except that the direction is opposite.

The "Manual interlock+ n-th axis" signal is valid for the axis moving in the plus direction, and this signal is valid for the axis moving in the minus direction.

These signals are for each control axis, and the number at the end of the signal name indicates the control axis No.

*-MITn
- 1 ..... Manual interlock- 1st axis
- :
- :
- 8 ..... Manual interlock- 8th axis

[Related signals]

(1) Manual interlock+ n-th axis (*+MITn: Y860)

(2) Automatic interlock+/- n-th axis (*+/-AITn: Y820/Y840)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	AUTOMATIC MACHINE LOCK n-TH AXIS	AMLK1 to 8	Y8A0 to 7	Y8A8 to F	Y8B0 to 7	Y8B8 to F

[Function]

During automatic operation, current position (counter) can be changed without actual machine motion to check program. These signals are for each control axis, and the number at the end of the signal name indicates the control axis No.

AMLKn
- 1 ..... Automatic machine lock 1st axis
- :
- :
- 8 ..... Automatic machine lock 8th axis

[Operation]

In the automatic operation (memory, MDI or tape), when this signal is ON, the current position (counter) can be changed on a specific axis (for which the signal is ON) without actual machine motion. If the signal turns ON in the middle of a block (during motion), block termination occurs after the completion of that block, and then the machine lock will be valid for the following blocks.

[Caution]

(1) If "Automatic machine lock" signal changes during automatic operation, block stop occurs after completion of the block in execution.

(2) To move only the table without drilling to confirm the drilling position, turn ON the signal for the 3rd axis (AMLK3) if the drilling axis is the 3rd axis. (Equivalent to Z axis cancel)

[Related signals]

(1) Manual machine lock, n-th axis (MMLKn: Y8C0)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	MANUAL MACHINE LOCK n-TH AXIS	MMLK1 to 8	Y8C0 to 7	Y8C8 to F	Y8D0 to 7	Y8D8 to F

[Function]

During manual operation, current position (counter) can be changed without actual machine motion to check program.

[Operation]

When this signal is ON, current position can be changed on a specific axis (n-th axis) without actual machine motion. If the signal turns ON or OFF during execution of a block, the operation continues until it is completed. It is required to stop motion of all axes to validate the machine lock.

These signals are for each control axis, and the number at the end of the signal name indicates the control axis No.

MMLKn
- 1 ..... Manual machine lock 1st axis
- :
- :
- 8 ..... Manual machine lock 8th axis

[Related signals]

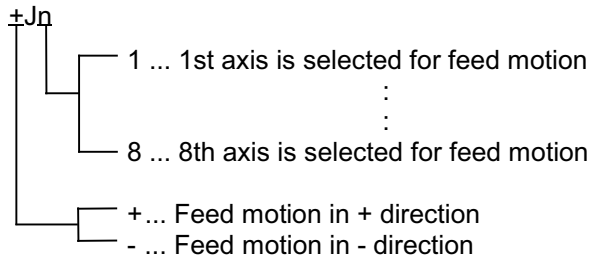
(1) Automatic machine lock n-th axis (AMLKn: Y8A0)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	FEED AXIS SELECTION+ n-TH AXIS	+J1 to 8	Y8E0 to 7	Y8E8 to F	Y8F0 to 7	Y8F8 to F

[Function]

This signal is used to start motion (jog feed, incremental feed or reference position return mode) in plus direction during manual operation.

These signals are for each control axis, and the number at the end of the signal name indicates the control axis No.

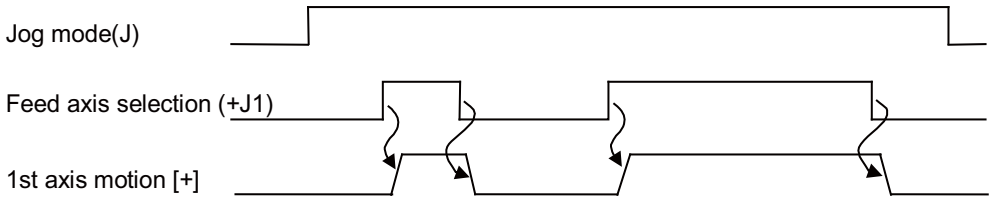

+Jn
1 ... 1st axis is selected for feed motion
:
:
8 ... 8th axis is selected for feed motion
+... Feed motion in + direction
- ... Feed motion in - direction

[Operation]

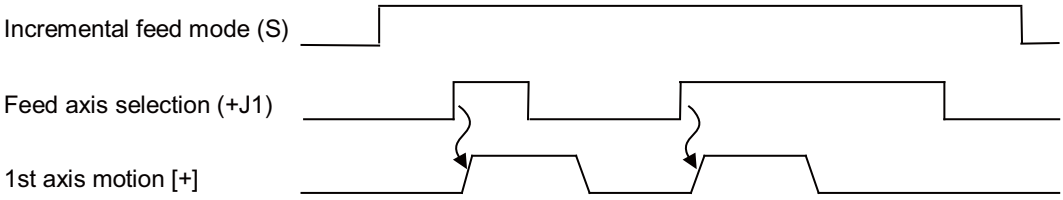
When "Feed axis selection" signal (+Jn) turns ON, the following motion occurs.

(1) When jog feed, incremental feed or reference position return is possible, motion in plus direction occurs on the selected axis.

(2) In jog feed, motion continues while the signal is ON.



(3) In incremental feed, amount (length) of motion depends on setting of "Handle/Incremental feed magnification code m". The motion is in plus direction. Even when signal (+Jn) turns OFF during motion, the motion (feed) does not stop. To start the motion again, turn ON the signal after the preceding motion has been completed.



(4) After reference position return mode is decelerated to approach speed by the near point detection dog, the motion continues, even after the feed axis selection signal is turned OFF, until motion reaches the reference position.

(Note 1) If feed axis selection plus [+] and minus [-] signals turn ON at the same time, neither plus signal nor minus signal is selected (same as the case where feed axis selection signal is OFF.)

(Note 2) If "Feed axis selection" signal turns ON before jog, incremental or reference position return mode is selected, the "Feed axis selection" signal is ignored. In this case, the signal should be turned OFF and then ON.

(Note 3) If reset is exerted while "Feed axis selection" signal is ON, or "Feed axis selection" signal turns ON during reset, the "Feed axis selection" signal is ignored even when the reset condition is canceled. In this case, the signal should be turned OFF and then ON.

(Note 4) The "Feed axis selection" signal will be invalid even if turned ON while the corresponding axis is decelerating (when command output is not completed). The signal must be turned OFF and ON again after the deceleration has completed completely (command output is completed). Special care is required when the feed axis direction changes.

(Note 5) In the 2nd part system specifications, even if the 1st part system and 2nd part system feed axis selection turn ON in the same cycle (scan) of the sequence, the start up may not be completely simultaneous.

[Related signals]

(1) Feed axis selection- n-th axis (-Jn: Y900)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	FEED AXIS SELECTION- n-TH AXIS	-J1 to 8	Y900 to 7	Y908 to F	Y910 to 7	Y918 to F

[Function]

This signal is used to feed the axis in the minus (-) direction during jog feed, incremental feed or reference position return mode in manual operation.

These signals are for each control axis, and the number at the end of the signal name indicates the control axis No. (Refer to the "Feed axis selection+ n-th axis" for details.)

[Operation]

The operation is the same as the feed axis selection+.

Use this signal to move in the minus (-) direction.

[Related signals]

(1) Feed axis selection+ n-th axis (+Jn: Y8E0)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	MANUAL/AUTOMATIC SIMULTANEOUS VALID n-TH AXIS	MAE1 to 8	Y920 to 7	Y928 to F	Y930 to 7	Y938 to F

[Function]

The automatic mode (tape, MDI, memory) and manual mode (handle, step, jog, manual reference position return) can be simultaneously selected allowing manual operation during automatic operation. (Arbitrary feed with the PLC is also possible.)

[Operation]

The manual/automatic simultaneous mode is entered when the automatic mode and manual mode are selected simultaneously. The manual operation axis operated during the manual/automatic simultaneous mode are selected by this signal.

The axis selected with this signal can be operated in the manual mode during automatic operation.

(Note 1) If an axis command is issued to an axis selected by this signal from the automatic mode, the "M01 OPERATION ERROR 0005" will occur. The automatic operation will be interlocked until the operation error is canceled.

(Note 2) During the automatic mode (when manual is not selected and manual/automatic simultaneous mode is not entered), this signal will be invalid and the interlock will not be applied.

(Note 3) If this signal turns ON in respect to an axis commanded with automatic during the manual/automatic simultaneous mode, an interlock will be applied on the axis, and the axis will immediately decelerate and stop. (The "M01 OPERATION ERROR 0005" will occur.)
After decelerating and stopping, operation with the manual mode will be possible. Note that the interlock will also be applied during the tap modal.

(Note 4) During the manual/automatic simultaneous mode and the automatic mode, the manual axis command for which this signal is OFF will be invalid. Note that interruption with the manual handle will be possible.

(Note 5) The feedrates for the automatic command axis and the manual command axis are different. The acceleration/deceleration mode (rapid traverse, cutting feed) are also independent.

(Note 6) The rapid traverse override, cutting feed override and 2nd cutting feedrate override are valid for both the automatic command axis and manual command axis. (Note that the cutting and 2nd cutting overrides to the manual command axis are valid when the manual cutting override is valid.) Override cancel is valid for the automatic command axis.

(Note 7) The manual interlock is valid for the manual command axis, and the automatic interlock is valid for the automatic command axis.

(Note 8) The in-cutting feed and in-rapid traverse signals will follow the automatic command axis movement mode.

(Note 9) The axis moving with manual movement will not stop with single block stop or feed hold.

(Note 10) If the G92 and G53 commands are issued in the manual mode to an axis for which this signal is ON, the G92 and G53 commands will be executed after the manual axis movement stops. (An axis command with G53 will cause an operation error after the manual axis movement stops.)

(Note 11) If a soft limit or OT is applied on the manual command axis during the manual/automatic simultaneous mode, the automatic command axis will also decelerate to a stop, and will enter the feed hold state.

<Relation with manual handle interrupt>

The operation of the automatic handle interruption during the manual/auto mode is as follows.

		Axis for which manual/automatic valid signal is ON	Axis for which manual/automatic valid signal is OFF
Handle mode selection	Automatic handle interrupt	The specifications of the manual/automatic simultaneous mode will be followed.The automatic axis command will cause an operation error, and only the manual axis command will be valid.	The specifications of the automatic handle interruption will be followed. Interruption with the handle can be applied in respect to the automatic axis movement.
Manual mode other than handle		Same as above	Same as above

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	MANUAL FEEDRATE B VALID n-TH AXIS	FBEn	Y940 to 7	Y948 to F	Y950 to 7	Y958 to F

[Function]

This signal validates manual feed using the manual feedrate B.

[Operation]

If this signal is validated when carrying out manual feed in the jog mode, the axis will move at the speed commanded by manual feedrate B which is commanded separately from the manual feedrate.

This signal is independent for the axes.

<Using the manual feedrate B> (Example for 1st part system)

(1) To set the feedrate common for all axes as the manual feedrate B
  (a) Select the JOG mode signal (J).
  (b) Turn ON the "Manual feedrate B valid n-th axis" signal (this signal) for the axis to be moved at the manual feedrate B.
  (c) Set the feedrate set as manual feedrate B in the "Manual feedrate B" register.
  (d) Turn ON the "Feed axis selection+" signal or "Feed axis selection-" signal for the axis to be moved at the manual feedrate B.

(2) To set the feedrate independent for each axis as the manual feedrate B
  (a) Select the JOG mode signal (J).
  (b) Turn ON the "Manual feedrate B valid n-th axis" signal (this signal) for the axis to be moved at the manual feedrate B. Also turn ON the "Each axis manual feedrate B valid" signal.
  (c) Set the feedrate set as each axis manual feedrate B in the "Each axis manual feedrate B n-th axis" register.
  (d) Turn ON the "Feed axis selection+" signal or "Feed axis selection-" signal for the axis to be moved at the each axis manual feedrate B.

(Note 1) Manual feedrate B is valid only for JOG feed, and is invalid in all other manual modes.

(Note 2) The rapid traverse mode is invalid for the manual feedrate B valid axis.

(Note 3) Manual override is invalid for the manual feedrate B valid axis.

(Note 4) The axis moving at the manual feedrate B will decelerate and stop when NC reset is input. To move the axis at the manual feedrate B again, cancel the NC reset, and then turn the axis selection signal OFF and ON.

(Note 5) Even if the feed axis selection signal is turned ON when the command speed is "0", an error will occur and the manual feedrate B valid axis will not move.

(Note 6) The manual/automatic simultaneous signal must be valid to move a random axis at the manual feedrate B during automatic operation.

(Note 7) The JOG mode signal must be validated simultaneously to move a random axis at the manual feedrate B during a manual operation mode other than the JOG mode.

(Note 8) During synchronous control, the "Manual feedrate B valid n-th axis" signal is invalid for the synchronized axis. The manual feedrate B signal issued for the reference axis is also valid for the synchronized axis.

[Related signals]

(1) JOG MODE (J: YC00)
(2) MANUAL FEEDRATE B (R2506 to 7)
(3) Each axis manual feedrate B valid (YC7C)
(4) Each axis manual federate B n-th axis (R5764 to 79)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	ZERO POINT INITIALIZATION SET MODE n-TH AXIS	AZS1 to 8	Y960 to 7	Y968 to F	Y970 to 7	Y978 to F

[Function]

This selects the zero point initialization set with the marked point alignment method in the absolute position detection system.

[Operation]

The zero point initialization set is selected with this signal.

Refer to the section on "Zero point initialization set completed" (ZSFn) signal for details on the operations.

(Note 1) This signal is a function signal for zero point initialization set, and is not a signal that selects the operation mode. Select the jog mode or handle mode to move the axis to a required position.

(Note 2) This signal is valid for the following specifications.- When servo detection specification (motor detector, servo system) is the absolute position detection system.- When "TYPE" on the [ABS. POSI PARAM] screen is set to "2".

[Related signals]

(1) Zero point initialization set completed (ZSFn: X8C0 to 7)
(2) Zero point initialization set error completed (ZSEn: X8E0 to 7)
(3) In initialization (R574)
(4) Initialization incompletion (R575)
(5) Zero point initialization set start (ZSTn: Y980 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	ZERO POINT INITIALIZATION SET START n-TH AXIS	ZST1 to 8	Y980 to 7	Y988 to F	Y990 to 7	Y998 to F

[Function]

This is used to set a random position as the origin during zero point initialization set using the marked point alignment method in the absolute position detection system.

[Operation]

This signal turns ON when a corresponding axis is moved in the zero point initialization set mode, and the position to be set as the zero point is reached.

Refer to the section on "Zero point initialization set completed" (ZSFn) signal for details on the operations.

(Note 1) This signal is a function signal for zero point initialization set, and is not a signal that selects the operation mode. Select the jog mode or handle mode to move the axis to a required position.

(Note 2) This signal is valid for the following specifications.
- When servo detection specification (motor detector, servo system) is the absolute position detection system.
- When "TYPE" on the [ABS. POSI PARAM] screen is set to "2".

(Note 3) This signal will be invalid in the following states.
- During emergency stop
- During reset
- When the "Zero point initialization set start" (ZSTn) signal is turned ON before the "Zero point initialization set mode" (AZSn) signal.

  In this case, turn this signal OFF once, and then turn it ON again.
- When the grid (Z-phase signal provided per motor rotation) has not been passed once after the power is turned ON.

[Related signals]

(1) Zero point initialization set completed (ZSFn: X8C0 to 7)
(2) Zero point initialization set error completed (ZSEn: X8E0 to 7)
(3) In initialization (R574)
(4) Initialization incompletion (R575)
(5) Zero point initialization set mode (AZSn: Y960 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	CURRENT LIMIT CHANGEOVER n-TH AXIS	ILC1 to 8	Y9A0 to 7	Y9A8 to F	Y9B0 to 7	Y9B8 to F

[Function][Operation]

This signal turns on when validating the current limit.

The current limit parameter switches from SV013 to SV014.

[Related signals]

(1) In current limit n-th axis (ILI1 to 8: X900 to 7)

(2) Current limit reached n-th axis (ILA1 to 8: X920 to 7)

(3) Droop release request n-th axis (DOR1 to 8: Y9C0 to 7)

(4) Current limit mode 1 and 2 (ILM1,2: YCC0,1)

(5) Current limit changeover (R2593)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	DROOP RELEASE REQUEST n-TH AXIS	DOR1 to 8	Y9C0 to 7	Y9C8 to F	Y9D0 to 7	Y9D8 to F

[Function][Operation]

During the current limit control, the droop generated by the current limit can be released.

[Related signals]

(1) In current limit n-th axis (ILI1 to 8: X900 to 7)

(2) Current limit reached n-th axis (ILA1 to 8: X920 to 7)

(3) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to 7)

(4) Current limit mode 1 and 2 (ILM1,2: YCC0,1)

(5) Current limit changeover (R2593)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	WORKPIECE COORDINATE MEASUREMENT 2ND AXIS		Y9E1	Y9E9	Y9F1	Y9F9

[Function] (L system)

The Z axis external workpiece coordinate offset data can be set by cutting the workpiece face with manual operations and inputting workpiece coordinate measurement 2nd axis.

[Operation]

(1) Mode selection

Set the mode selection switch to the manual mode ([Handle], [Jog] or [Rapid Traverse]).

(2) Tool measurement mode signal input

Set the tool measurement mode signal to "1".

(3) Main/sub selection

Using the tool presetter sub-side valid signal, select whether to measure the workpiece coordinates on the main spindle side or sub-spindle side.

<Tool presetter sub-side valid signal>

OFF : The compensation No. is retrieved from the main spindle side R registers.

ON : The compensation No. is retrieved from the sub-spindle side R registers.

(Note 1) Hold the state of this signal until the measurement with the selected tool is completed.

(4) Tool selection

Issue the T command with MDI operation, etc., and select the tool.

(Note 1) Set the selected tool compensation No. in the R register.
The set R register differs according to the parameter setting and the state of the tool presetter sub-side valid signal.

(Note 2) Set the "tool length/wear data" for the tool being used beforehand.

Compensation No. R registers

#1098 Tlno.	#1130 set_t	#1218 aux02 bit4	Tool length compensation No.		Tool nose wear compensation No.	
			Main side	Sub-side	Main side	Sub-side
0	0	0/1	R2600,R2601	R2604,R2605	R2600,R2601	R2604,R2605
	1	0/1				
1	0	0	R536,R537		R2600,R2601	R2604,R2605
		1	R2602,R2603	R2606,R2607	R2600,R2601	R2604,R2605
	1	0/1	R2602,R2603	R2606,R2607	R2600,R2601	R2604,R2605

- When the compensation No. is 0, the compensation amount will be calculated as "0".
- If the compensation No. exceeds the number of specified offset sets, the "Compensation No. illegal" error will occur.
- Whether to use the main side or sub-side is selected with the tool presetter sub-side valid signal. (OFF: Main side, ON: Sub-side)

(5) Cutting the workpiece face

If the workpiece face has not been cut, cut the workpiece face slightly to even it.

(Note 1) Do not move the tool in the detection of Z axis after cutting the workpiece face.

(Note 2) If the workpiece does not need to be cut, carry out positioning to the measurement position.

(6) Setting the Z axis external workpiece coordinate offset data with the workpiece coordinate measurement 2nd axis signal input

Input the workpiece coordinate measurement 2nd axis signal (this signal). The Z axis external workpiece coordinate offset data is automatically calculated from the tool compensation data of the used tool and the machine value at the point this signal is input. The results are set as the data.

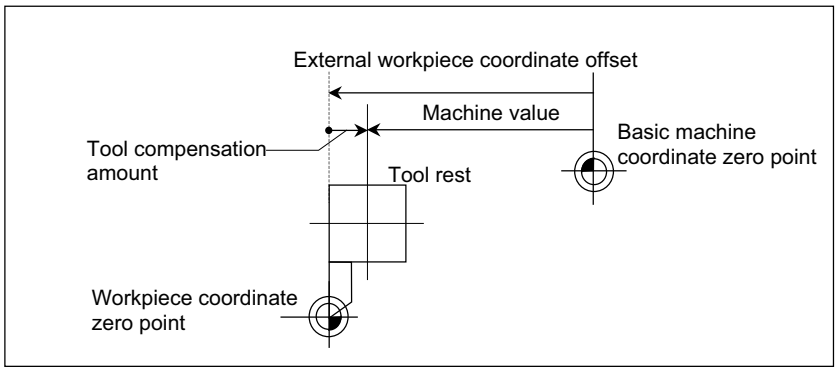
(a) Details of automatic calculation expression

The external workpiece coordinate offset data is automatically calculated with the following expression.

External workpiece coordinate offset = Machine coordinate value - tool compensation data

The tool compensation data used for the measurement is selected with the base specification parameter "#1226 aux10 bit0".

aux10 bit0	Tool compensation data
0	Tool length data + nose wear data
1	Tool length data



(7) Turning the tool measurement mode signal OFF

Measurement of the external workpiece coordinate offset is completed.

[Related signals]

(1) Tool presetter sub-side valid (YCDA)
(2) Tool compensation No. (Main side: R2600 to R2603, Sub side: R2604 to R2607)
(3) Tool length measurement 2 (TLMS: YC21)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	CONTROL AXIS DETACH 2 n-TH AXIS	DTCH21 to 28	YA00 to 7	YA08 to F	YA10 to 7	YA18 to F

[Function]

A control axis can be excluded from the control targets with this function.

This signal is present for each control axis. The end numbers in the signal name indicate the control axis No.

DTCH2n
- 1: The 1st axis is set as axis detach 2.
- :
- :
- 8: The 8th axis is set as axis detach 2.

[Operation]

When the "Control axis detach 2" signal (DTCH2n) turns ON, the corresponding axis is excluded from the control targets.

(1) Position control cannot be carried out, but the position is not lost because the position detection is valid.
(2) The "Interlock" signal of the corresponding axis is considered turned ON.
(3) The corresponding axis also appears in the CRT position display.

[Related signals]

(1) Control axis detach n-th axis (DTCHn: Y780)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	UNCLAMP COMPLETION n-TH AXIS	UCLPFn	YA20 to 7	YA28 to F	YA30 to 7	YA38 to F

[Function]

This signal indicates that unclamping has been completed in respect to the unclamp command from the CNC.

[Operation]

When the unclamp command signal turns ON, the clamp on the corresponding axis is released by the PLC, and then this signal turns ON.

When the unclamp command turns OFF, the corresponding axis is clamped by the PLC, and then this signal turns OFF.

[Related signals]

(1) Unclamp command (UCLPn:X960 to X967)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	MIXED CONTROL (CROSS AXIS CONTROL) REQUEST n-TH AXIS	CRS1 to 8	YA60 to 7	YA68 to F	YA70 to 7	YA78 to F

[Function]

The mixed control (cross axis control) is turned ON and OFF with the PLC signal. By using parameter, designate which axis enters mixed control (cross axis control) state by this signal.

[Operation]

(1) Mixed control (cross axis control) control command using PLC signals

There are "mixed control (cross axis control) request" signals (CRS1 to CRS8) for eight axes in each part system. (There are signals for eight axes regardless of the actual number of axes.)

Cross machining is carried out by exchanging the axis for which the PLC signal is input and the axis designated with parameter at the rising edge (0 to 1) of this signal. If an axis is not mounted at the section where the PLC signal is input, the axis designated with the parameter will be moved from another part system.

The axis cross machining state is canceled at the falling edge (1 to 0) of this signal, and normal control is applied.

(2) Commanding in the machining program

Turn the "mixed control (cross axis control) " signal ON/OFF using M or T command, etc. to carry out the mixed control (cross axis control).

Carry out timing synchronization operation before the M command and T command, etc., for mixed control (cross axis control) so that the timing for the mixed control (cross axis control) matches.

[Related signals]

(1) In mixed control (cross axis control)(X980 to X987)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	SYNCHRONOUS CONTROL REQUEST n-TH AXIS	SYNC1 to 8	YA80 to 7	YA88 to F	YA90 to 7	YA98 to F

[Function]

Whether to start or cancel synchronous control is selected with a signal corresponding to the synchronized axis.

1 → 0 (falling edge) Synchronous control cancel

0 → 1 (rising edge) Synchronous control start

[Operation]

Synchronous control is started and canceled with the rising edge (OFF to ON) or falling edge (ON to OFF) of the PLC signal (SYNC1 to 8) corresponding to the synchronized axis.

Thus, if synchronous control is canceled by a cause other than the PLC signal turning OFF, such as by emergency stop, and synchronous control is to be started again, turn the PLC signal OFF and then ON again.

The synchronization reference axis corresponding to each synchronized axis is set with the parameter "#2088 bsax_sy".

The movement direction of the synchronized axis in respect to the movement of the synchronized reference axis is determined by the value set for parameter "#2087 syncnt".

0 : moves in the same direction as the reference axis

1 : moves in the opposite direction of the reference axis

[Caution]

(1) The two axes related to control (synchronous/superimposition control) are both controlled in the smoothing zero state. Control is started after the axis movement has ended and smoothing zero is established.

(2) Control (synchronous/superimposition control) are affected by the state of the two target part systems. Thus, attention must be paid to the timing synchronization between part systems. Always command synchronization before commanding the control PLC signal.

(3) Control (synchronous/superimposition control) cannot be commanded to an axis in inclined axis control. An operation error will occur if this type of command is issued.

(4) Before control (synchronous/superimposition control) is started, the target axis must have completed reference position return after the power was turned ON, or the absolute position must be established. An operation error will occur if the above state is not established.

(5) A movement command cannot be issued to a synchronized axis during synchronous control. An operation error will occur if movement is commanded.

(6) An axis in synchronous control cannot be commanded as the superimposition control axis. An operation error will occur if this type of command is issued.

(7) A synchronized axis in synchronous control cannot be commanded as the synchronized axis for other synchronous control. An operation error will occur if this type of command is issued. Note that a single axis can be designated as the synchronized reference axis for several synchronized controls.

[Related signals]

(1) In synchronous/superimposition control (X9A0 to X9A7)

(2) Synchronous error amount (R5076 to R5091)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	SUPERIMPOSITION CONTROL REQUEST n-TH AXIS	PILE1 to 8	YAA0 to 7	YAA8 to F	YAB0 to 7	YAB8 to F

[Function]

Whether to start or cancel superimposition control is selected with a signal corresponding to the superimposed axis.

1 → 0 (falling edge) Superimposition control cancel

0 → 1 (rising edge) Superimposition control start

[Operation]

Superimposition control is started and canceled with the rising edge (OFF to ON) or falling edge (ON to OFF) of the PLC signal (PILE1 to 8) corresponding to the superimposed axis.

Thus, if superimposition control is canceled by a cause other than the PLC signal turning OFF, such as by emergency stop, and superimposition control is to be started again, turn the PLC signal OFF and then ON again.

The reference axis corresponding to each superimposed axis set with the parameter "#2089 bsax_pl".

The movement direction of the superimposed axis in respect to the movement of the reference axis is determined by the value set for parameter "#2143 polar".

0 : moves in the same direction as the reference axis

1 : moves in the opposite direction of the reference axis

[Caution]

(1) This signal will be ignored if 0 is set to the parameter "#1280 ext16/bit7".

(2) Make sure to command a timing synchronization for the superimposed axis and the reference axis in a previous or next block of the block to command this signal.

[Related signals]

(1) In synchronous/superimposition control signal (X9A0 to 7)

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	NC AXIS CONTROL SELECTION n-TH AXIS	-	YAC0 to 7	YAC8 to F	YAD0 to 7	YAD8 to F

[Function]

This signal is used to select the control method over the NC axes which can be operated under PLC control.

0: PLC control

1: NC control

[Operation]

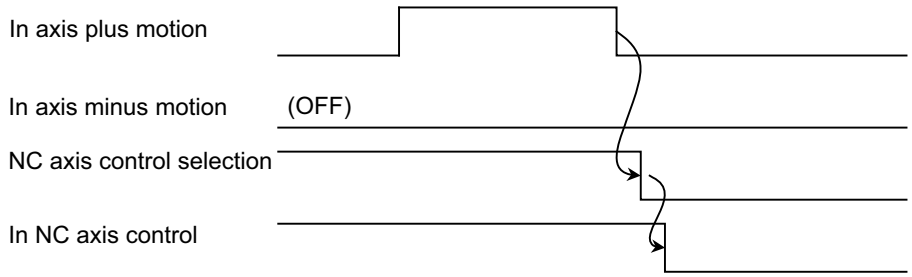
When this signal is ON, the axis is controlled with a machining program. (The axis is handled as NC axis.)

When this signal is OFF, the axis is controlled with the PLC axis indexing interfaces. (The axis is handled as PLC axis.)

The following shows the correspondence of axis Nos. and device Nos.

Device No.	Signal name	Device No.	Signal name
YAC0	NC axis control selection 1st axis	YAC4	NC axis control selection 5th axis
YAC1	NC axis control selection 2nd axis	YAC5	NC axis control selection 6th axis
YAC2	NC axis control selection 3rd axis	YAC6	NC axis control selection 7th axis
YAC3	NC axis control selection 4th axis	YAC7	NC axis control selection 8th axis

[Timing chart]



[Caution]

(1) This signal is available only for the NC axis which can be operated under PLC control. "The NC axis which can be operated under PLC control" has the axis No. for PLC axis indexing, designated by "#12800 chgauxno".

(2) Turn ON/OFF this signal after confirming that the axis is not moving.
Turning this signal ON/OFF during the axis movement leads an operation error. The axis decelerates and stops then.
(Usage example) When the parameters are set as follows

Axis No.	1	2	3	4	5
#1013 axname	X	Y	Z	A	C
#12800 chgauxno	0	0	0	1	2

A-axis and C-axis can be operated under PLC control. To operate the A-axis under NC control, turn the signal YAC3 ON. The signals YAC0 to YAC2 and YAC5 to YAC7 are not available.

[Related signals]

(1) In NC axis control n-th axis (XA20 to XA27)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	VERTICAL AXIS PULL-UP PREVENTION REQUEST n-TH AXIS		YAE0 to 7	YAE8 to F	YAF0 to 7	YAF8 to F

[Function]

This signal prevents the vertical axis pull-up function: the vertical axis will not be pulled up.

[Operation]

When this signal turns ON, NC will operate as follows.

(1) Command the drive unit to prevent vertical axis pull-up.
(2) Turns ON the "Vertical axis pull-up prevented" signal.

When this signal turns OFF, NC will operate as follows.

(1) Command the drive unit to cancel the prevention of vertical axis pull-up.
(2) Turns OFF the "Vertical axis pull-up prevented" signal.

[Related signals]

(1) Vertical axis pull-up prevented (XA60 to 7)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	HOB MACHINING: RETRACT AMOUNT SELECTION n-TH AXIS	HOBRTVn	YB20 to 7	YB28 to F	YB30 to 7	YB38 to F

[Function]

This signal is used to select the parameter for setting the travel distance in hob retract.

[Operation]

When the signal is OFF:

The setting value of "#8219 Hob retract amount 1" is used.

When the signal is ON:

The setting value of "#8220 Hob retract amount 2" is used.

[Related signals]

(1) Hob machining: retract request (HOBRTR:YCDE)
(2) Hob machining: retracting (HOBRTM:XCAE)
(3) Hob machining: retracting complete (HOBRTF:XCAF)

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	SPINDLE-MODE ROTARY AXIS CONTROL COMMAND N-TH AXIS	ROTSPC1 to 8	YB40 to 7	YB48 to F	YB50 to 7	YB58 to F

[Function]

This signal turns ON when controlling an axis, for which rotary axis spindle control is enabled with the parameter, as a spindle (spindle control mode).

This signal turns OFF when the axis is controlled as a rotary axis (servo axis control mode).

Each control axis is provided with this signal. The last number of the signal name indicates the control axis No.

ROTSPCn
- 1 : Turn the spindle control mode ON in 1st axis.
- :
- :
- 8 : Turn the spindle control mode ON in 8th axis.

[Operation]

(1) The axis for which rotary axis spindle control is enabled enters the spindle control mode when the following operation is performed: turning the Spindle-mode rotary axis control command (ROTSPCn) ON while the Reference position establishment (1st axis: X9E0 to 8th axis: X9E7 of part system 1, and following) is ON and the All axes smoothing zero is (TSMZ) ON.

(2) When the spindle control mode is entered, the Spindle-mode rotary axis control mode (ROTSPMn) turns ON. The axis can be controlled as a spindle by executing S commands after checking that this signal is ON.

(3) The control mode changes from the spindle control mode to servo axis control mode when the Spindle-mode rotary axis control command (ROTSPCn) turns OFF. The Spindle-mode rotary axis control mode (ROTSPMn) turns OFF when the servo axis control mode is entered.

[Related signals]

(1) Spindle-mode rotary axis control mode n-th axis (ROTSPMn:XB40-)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	STORED STROKE LIMIT 1 : CHANGE REQUEST n-TH AXIS	SLMCn	YB60 to YB67	YB68 to YB6F	YB70 to YB77	YB78 to YB7F

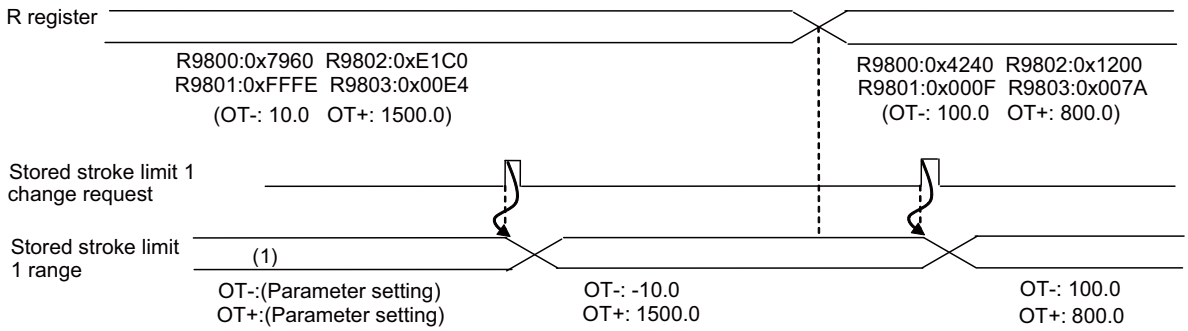
[Function]

This signal is used to update the range of stored stroke limit I to the one set in R registers.

[Operation]

At the rising edge (OFF → ON) of this signal, the range of stored stroke limit I changes to the values of the R registers specified by the parameter ”#2190 OT_Rreg”. Note however that the limit range is updated at the rising edge of this signal only when the parameter “#1278 ext14/bit2” is ON and when a user area’s R register number is set in the parameter “#2190 OT_Rreg” of the corresponding axis.

User area	R8300 to R9799	1500 points of backup area
	R9800 to R9899	100 points of non-backup area
	R18300 to R19799	1500 points of backup area
	R19800 to R19899	100 points of non-backup area
	R28300 to R29799	1500 points of backup area
	R29800 to R29899	100 points of non-backup area



Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
	REAL-TIME TUNING 1: SPEED CONTROL GAIN HOLD-DOWN COMMAND	VGHLDC1 to 8	YB80 to 7	YB88 to F	YB90 to 7	YB98 to F

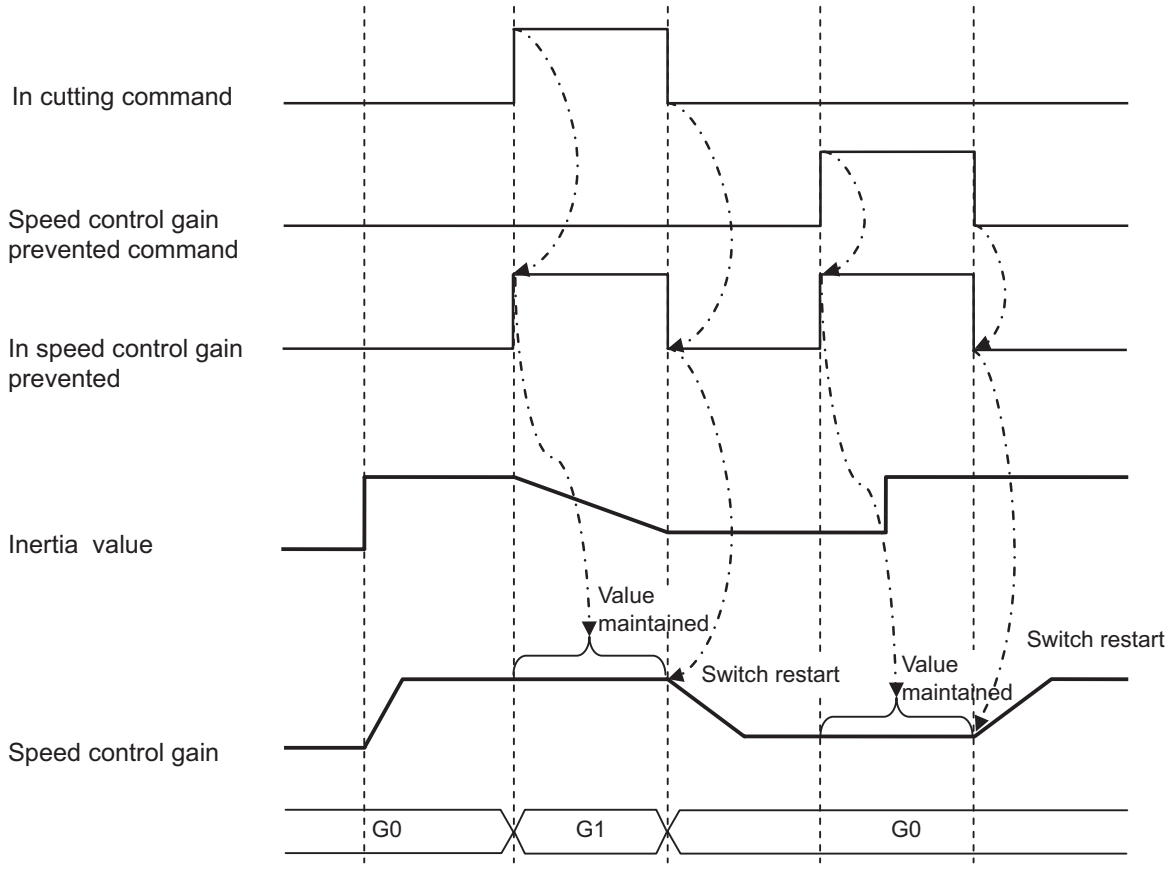
[Function]

This signal is used to stop speed control gain switching of the real-time tuning 1 function. Speed control gain switching is stopped if this signal turns ON while this function is enabled.

[Operation]

ON: Speed control gain switching is stopped.

OFF: Speed control gain switching is not stopped.



[Related signals]

Real-time tuning 1: Speed gain hold-down ON (VGHLD1:XB80)

Con-tact	Signal name	Signal abbre-viation	$1	$2	$3	$4
A	MACHINE GROUP-BASED ALARM STOP: MACHINE GROUP-BASED PLC INTERLOCK	GQEMG1 to 8	YBE0 to 7	YBE8 to F	YBF0 to 7	YBF8 to F

[Function]

The "Machine group-based PLC interlock" signal is transmitted.

[Operation]

If the Machine group-based PLC interlock (GQEMG) turns ON, the controller to which the axes belong enters the interlock state, and signals such as the Servo ready completion (SA) turn OFF.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	JOG MODE	J	YC00	YD40	YE80	YFC0	Y1100	Y1240	Y1380	Y14C0

[Function]

JOG operation mode (manual operation) is selected.

[Operation]

When JOG mode signal (J) turns ON, JOG operation mode is selected.

Axis motion is started by turning ON the "Feed axis selection+ (+J1 to 8) or Feed axis selection- (-J1 to 8)" signal after turning ON the jog mode and setting the manual federate code (*JV1 to 16).

The axis travel speed is set in "#2642 jogfeed (Jog feed rate)" or by PLC signal selected by the Manual feedrate method selection signal (YC77).

For rapid traverse, "Rapid traverse" signal (RT) is turned ON together with this signal (J).

If the operation mode duplicates the other mode or if it is removed, the NC alarm "M01 OPERATION ERROR 0101" will occur.

[Related signals]

(1) Feed axis selection (+J1 to 8: Y8E0, -J1to 8: Y900)
(2) Manual feedrate method selection (JVS: YC77)
(3) Manual feedrate code m (*JV1 to 16: YC70 to 4)
(4) Manual feedrate (method selection) (R2504,5)
(5) Rapid traverse (RT: YC26)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	HANDLE MODE	H	YC01	YD41	YE81	YFC1	Y1101	Y1241	Y1381	Y14C1

[Function]

"Handle feed operation" mode (manual operation) is selected.

[Operation]

When HANDLE mode signal (H) is turned ON, HANDLE FEED mode is selected.

Axis motion starts when the manual pulse generator handwheel is rotated after axis is selected by handle axis selection code (HS11 to 116, HS1S, HS21 to 216, HS2S, HS31 to 316, HS3S) and this signal is turned ON. Speed of the axis motion depends on setting of feedrate magnification (MP1 to 4).

If the operation mode duplicates the other mode or if it is removed, the NC alarm "M01 OPERATION ERROR 0101" will occur.

[Related signals]

(1) 1st handle axis selection code (HS11 to 116: YC40), 1st handle valid (HS1S: YC47)
(2) 2nd handle axis selection code (HS21 to 216: YC48), 2nd handle valid (HS2S: YC4F)
..... Valid only for handle 2-axis spec.
(3) 3rd handle axis selection code (HS31 to 316: YC50), 3rd handle valid (HS3S: YC57)
..... Valid only for handle 3-axis spec.
(4) Handle/Incremental feed magnification code m (MP1 to 4: YC80 to YC82)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	INCREMENTAL MODE	S	YC02	YD42	YE82	YFC2	Y1102	Y1242	Y1382	Y14C2

[Function]

INCREMENTAL FEED mode (manual operation) is selected.

[Operation]

When incremental mode command signal (S) is turned ON, INCREMENTAL FEED mode is selected.

Each time "Feed axis selection" signal (+J1 to 8, -J1 to 8) for desired axis is turned ON, axis motion starts. Speed of the axis motion (incremental feed) depends on setting of "Handle/Incremental feed magnification code m" (MP1 to 4).

When "Rapid traverse" signal (RT) is ON, speed is the rapid traverse speed. When signal (RT) is OFF, speed is equal to "Manual federate" (*JV1 to 16).

If the signal is the same as another operation mode or if it is removed, the NC alarm "M01 OPERATION ERROR 0101" will occur.

(Note 1) The incremental mode is also called as step mode.

[Related signals]

(1) Handle/Incremental feed magnification code m (MP1 to 4: YC80 to YC82)
(2) Feed axis selection (+J1 to 8: Y8E0, -J1 to 8: Y900)
(3) Manual feedrate code m (*JV1 to 16: YC70)
(4) Rapid traverse (RT: YC26)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED MODE	PTP	YC03	YD43	YE83	YFC3	Y1103	Y1243	Y1383	Y14C3

[Function]

MANUAL ARBITRARY FEED mode in manual operation is selected.

[Operation]

MANUAL ARBITRARY FEED mode is selected when this signal is turned ON ("1").

[Caution]

To turn the MANUAL ARBITRARY FEED mode ON, the rest of the manual modes and the automatic mode must be OFF (0).

Otherwise, this mode cannot be selected. (Note that this mode can be selected simultaneously when manual/automatic simultaneous is valid.)

[Related signals]

(1) Signals from PLC to controller

Device No.					
$1	$2	$3	$4	Abbreviation	Signal name
YCA0	YDE0	YF20	Y1060	CX11	Manual arbitrary feed 1st axis selection code 1
YCA1	YDE1	YF21	Y1061	CX12	Manual arbitrary feed 1st axis selection code 2
YCA2	YDE2	YF22	Y1062	CX14	Manual arbitrary feed 1st axis selection code 4
YCA3	YDE3	YF23	Y1063	CX18	Manual arbitrary feed 1st axis selection code 8
YCA4	YDE4	YF24	Y1064	CX116	Manual arbitrary feed 1st axis selection code 16
YCA5	YDE5	YF25	Y1065		
YCA6	YDE6	YF26	Y1066		
YCA7	YDE7	YF27	Y1067	CX1S	Manual arbitrary feed 1st axis valid

Device No.					
$1	$2	$3	$4	Abbreviation	Signal name
YCA8	YDE8	YF28	Y1068	CX21	Manual arbitrary feed 2nd axis selection code 1
YCA9	YDE9	YF29	Y1069	CX22	Manual arbitrary feed 2nd axis selection code 2
YCAA	YDEA	YF2A	Y106A	CX24	Manual arbitrary feed 2nd axis selection code 4
YCAB	YDEB	YF2B	Y106B	CX28	Manual arbitrary feed 2nd axis selection code 8
YCAC	YDEC	YF2C	Y106C	CX216	Manual arbitrary feed 2nd axis selection code 16
YCAD	YDED	YF2D	Y106D		
YCAE	YDEE	YF2E	Y106E		
YCAF	YDEF	YF2F	Y106F	CX2S	Manual arbitrary feed 2nd axis valid

Device No.					
$1	$2	$3	$4	Abbreviation	Signal name
YCB0	YDF0	YF30	Y1070	CX31	Manual arbitrary feed 3rd axis selection code 1
YCB1	YDF1	YF31	Y1071	CX32	Manual arbitrary feed 3rd axis selection code 2
YCB2	YDF2	YF32	Y1072	CX34	Manual arbitrary feed 3rd axis selection code 4
YCB3	YDF3	YF33	Y1073	CX38	Manual arbitrary feed 3rd axis selection code 8
YCB4	YDF4	YF34	Y1074	CX316	Manual arbitrary feed 3rd axis selection code 16
YCB5	YDF5	YF35	Y1075		
YCB6	YDF6	YF36	Y1076		
YCB7	YDF7	YF37	Y1077	CX3S	Manual arbitrary feed 3rd axis valid

Device No.					
$1	$2	$3	$4	Abbreviation	Signal name
YCB8	YDF8	YF38	Y1078	CXS1	Manual arbitrary feed smoothing off
YCB9	YDF9	YF39	Y1079	CXS2	Manual arbitrary feed axis independent
YCBA	YDFA	YF3A	Y107A	CXS3	Manual arbitrary feed EX. F/MODAL.F
YCBB	YDFB	YF3B	Y107B	CXS4	Manual arbitrary feed G0/G1
YCBC	YDFC	YF3C	Y107C	CXS5	Manual arbitrary feed MC/WK
YCBD	YDFD	YF3D	Y107D	CXS6	Manual arbitrary feed ABS/INC
YCBE	YDFE	YF3E	Y107E	*CXS7	Manual arbitrary feed stop
YCBF	YDFF	YF3F	Y107F	CXS8	Manual arbitrary feed strobe

Device No.					
$1	$2	$3	$4	Abbreviation.	Signal name
R2508	R2708	R2908	R3108		1st handle/incremental feed magnification
R2509	R2709	R2909	R3109		
R2510	R2710	R2910	R3110		2nd handle feed magnification
R2511	R2711	R2911	R3111		
R2512	R2712	R2912	R3112		3rd handle feed magnification
R2513	R2713	R2913	R3113		
R2544	R2744	R2944	R3144		Manual arbitrary feed 1st axis travel amount
R2545	R2745	R2945	R3145		
R2546	R2746	R2946	R3146		
R2547	R2747	R2947	R3147		
R2548	R2748	R2948	R3148		Manual arbitrary feed 2nd axis travel amount
R2549	R2749	R2949	R3149		
R2550	R2750	R2950	R3150		
R2551	R2751	R2951	R3151		
R2552	R2752	R2952	R3152		Manual arbitrary feed 3rd axis travel amount
R2553	R2753	R2953	R3153		
R2554	R2754	R2954	R3154		
R2555	R2755	R2955	R3155		

(2) Signals from controller to PLC
  (a) In manual arbitrary feed mode (PTPO: XC03)
  (b) In manual arbitrary feed (CXN: XC16)
  (c) Manual arbitrary feed completion (CXFIN: XC1C)

(3) Other
  (a) Feedrate least increment code 1,2 (PCF1: YC78, PCF2: YC79)
  (b) Manual/Automatic simultaneous valid n-th axis (MAE1 to 8)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	REFERENCE POSITION RETURN MODE	ZRN	YC04	YD44	YE84	YFC4	Y1104	Y1244	Y1384	Y14C4

[Function]

REFERENCE POSITION RETURN mode is selected.

"Reference position return" is that axis motion component (tool, table, etc.) is returned to the position previously determined for individual machine.

[Operation]

The reference position return mode is selected when the "Reference position return mode" signal (ZRN) is turned ON. Select the reference position return mode, and turn ON the "Feed axis selection" signal (+J1 to 8, -J1 to 8) of designated axis to return to the reference position.

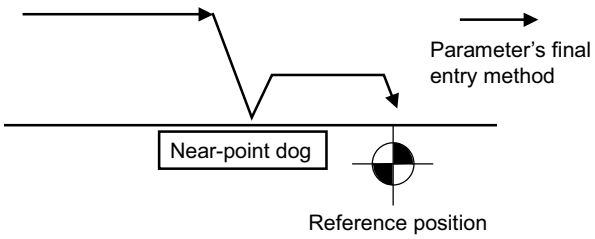
If the signal is the same as another operation mode or if it is removed, the NC alarm "M01 OPERATION ERROR 0101" will occur.

The first reference position return after the controller power is turned ON is the dog-type return (excluding when the basic machine coordinate system is established for the absolute position detection specifications). After the second manual reference position return (when basic machine coordinate system is established), the dog-type or high-speed return is selected with the machine parameters, basic specification parameter "#1063 mandog".

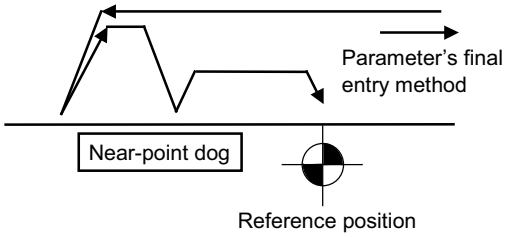
(1) Dog-type reference position return pattern

The return pattern is determined by the final entry method of the machine parameter reference position return.

(a) Operation when axis is moved in same direction as the final entry method, and dog is tripped.



(b) When axis is moved in opposite direction from final entry method, and dog is tripped.



- After the near-point dog is detected and the approach speed is applied, the axis will move to the reference position even if the "Feed axis selection" signal is turned OFF. Thus, after the approach speed is applied, another axis can be switched to and reference position return executed.
- The entry direction (final entry direction) after the near-point dog is tripped is set with parameters.
- The feedrate before the approach speed is the reference position return feedrate if the "Rapid traverse" signal (RT) is ON, and the "Manual feedrate" (*JV1 to 16) is OFF.
- The approach speed is set with the parameters.
- When the reference position is reached, the movement will stop even if the feed axis selection signal is ON, and the "1st reference position reached" signal (ZP1n) will turn ON.

(2) High-speed reference position return

- The axis will move toward the reference position. The motion speed will be rapid traverse if the rapid traverse signal is ON, and manual feedrate if OFF.
- When the reference position is reached, the movement will stop even if the feed axis selection signal is ON, and the "1st reference position reached" signal (ZP1n) will turn ON.
- The feed axis selection signal for high-speed return is valid only in the reference position direction. If the opposite direction signal is designated, the NC alarm "M01 Operation error 0003" will occur.

[Related signals]

(1) Feed axis selection (+J1 to 8: Y8E0, -J1 to 8: Y900)
(2) Manual feedrate code m (*JV1 to 16: YC70)
(3) Rapid traverse (RT: YC26)
(4) 1st reference position reached (ZP11 to 18: X800 to 7)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	AUTOMATIC INITIALIZATION MODE	AST	YC05	YD45	YE85	YFC5	Y1105	Y1245	Y1385	Y14C5

[Function]

The automatic initialization mode is selected.

[Operation]

This mode is selected when automatic initialization is to be carried out with the machine end stopper method of absolute position detection.

The initialization is started when the automatic initialization mode is selected, and the "Feed axis selection" (+Jn, -Jn) signal in the direction of the machine end of the axis to be initialized is turned ON.

(Note 1) The automatic initialization mode is invalid when the absolute position detector is not provided and when the machine end stopper method is not selected for the absolute position detection.
(During feed axis selection, "M01 OPERATION ERROR 0024" will occur.)

(Note 2) This mode will not start in the following cases of the machine end stopper method absolute position detection.
(The message "Start not possible" will display.
- When "#0 Absolute posn set" on the [ABS. POSITION SET] screen is not set to "1".
- When "#2 Zero-P" on the [ABS. POSITION SET] screen has not been set.
- When "#2055 pushf" on the [ABS. POSITION PARAMETER] screen has not been set.
- When "Z71 0005" has occurred.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MEMORY MODE	MEM	YC08	YD48	YE88	YFC8	Y1108	Y1248	Y1388	Y14C8

[Function]

MEMORY mode of automatic operation is selected.

In this mode of operation, automatic operation is based on programs stored in the memory.

[Operation]

- MEMORY mode is selected when "Memory mode" signal (MEM) turns ON.
- The program is started with the "Automatic operation "start" command" signal (ST).
- If the automatic operation mode is duplicated or canceled during automatic operation, the NC alarm "M01 OPERATION ERROR 0101" will occur, and the block will stop.

(Note 1) Even when operation mode is other than automatic operation, illegal mode, if selected, causes operation error.

[Related signals]

(1) Automatic operation "start" command (ST: YC10)
(2) Automatic operation "pause" command (*SP: YC11)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TAPE MODE	T	YC09	YD49	YE89	YFC9	Y1109	Y1249	Y1389	Y14C9

[Function]

TAPE mode of automatic operation is selected.

In this mode of operation, automatic operation is based on tape command (RS232-C input) programs stored in NC tape.

[Operation]

- Tape mode is selected when "Tape mode" (T) signal turns ON.
- The program is started with the "Automatic operation "start" command" signal (ST).
- If the automatic operation mode is duplicated or canceled during automatic operation, the NC alarm "M01 OPERATION ERROR 0101" will occur, and the block will stop.

(Note 1) Even when operation mode is other than automatic operation, illegal mode, if selected, causes operation error.

[Related signals]

(1) Automatic operation "start" command (ST: YC10)
(2) Automatic operation "pause" command (*SP: YC11)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MDI MODE	D	YC0B	YD4B	YE8B	YFCB	Y110B	Y124B	Y138B	Y14CB

[Function]

MDI (Manual Data Input) mode of automatic operation is selected.

Automatic operation is performed with the program set in the MDI screen.

[Operation]

- MDI mode is selected when "MDI mode" (D) signal turns ON.
- The program is started with the "Automatic operation "start" command" signal (ST).
- If the automatic operation mode is duplicated or canceled during automatic operation, the NC alarm "M01 OPERATION ERROR 0101" will occur, and the block will stop.

(Note 1) Even when operation mode is other than automatic operation, illegal mode, if selected, causes operation error.

[Related signals]

(1) Automatic operation "start" command (ST: YC10)

(2) Automatic operation "pause" command (*SP: YC11)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SUB PART SYSTEM CONTROL: SUB PART SYSTEM CONTROL I MODE	SBSM	YC0E	YD4E	YE8E	YFCE	Y110E	Y124E	Y138E	Y14CE

[Function]

This signal specifies the sub part system used in the Sub part system control I.

After this signal turns ON and the Sub part system control I mode is entered, the sub part system can be started by executing the Sub part system control I (G122) commands.

[Operation]

The part system for which this signal turned ON outputs the "Sub part system control: Sub part system control I mode ON" signal (SBSMO:XC0E) to the PLC.

[Related signals]

(1) Sub part system control: Sub part system control I mode ON (SBSMO: XC0E)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	AUTOMATIC OPERATION "START" COMMAND (Cycle start)	ST	YC10	YD50	YE90	YFD0	Y1110	Y1250	Y1390	Y14D0

[Function]

This signal is used to start automatic operation in MEMORY mode, MDI mode or TAPE mode, or to restart after automatic operation pause (halt) or block stop.

[Operation]

(1) "Automatic operation "start" command" (ST) signal arises when the pressed "auto operation start" pushbutton is released (i.e. at the time the signal turns OFF). The signal must be ON for a min. of 100msec.

(2) "In automatic operation "start"" signal (status signal "STL") turns ON when the pressed "auto operation start" pushbutton is released, and turns OFF when "auto operation pause (or halt)" pushbutton is pressed or block stop occurs in single-block operation.

(3) Signal (ST) is invalid when:
- Automatic operation starts.
- Automatic operation "pause" command" (*SP) signal is OFF.
- During reset ("Reset & rewind" signal is ON).
- During alarm.
- Sequence No. is being searched for.

(4) Automatic operation stops or is suspended or block stops when:
- Automatic operation "pause" command" (*SP) signal turns OFF.
- Reset occurs ("Reset & rewind" signal turns ON).
- Alarm which causes stop to automatic operation occurs.
- Automatic operation mode is changed to manual operation mode.
- Mode is changed to other automatic operation mode and then the block in execution is completed.
- Block in execution is completed after "Single-block" (SBK) signal turns ON.
- Block in execution is completed after "Automatic machine lock" signal (AMKL) turns ON.
- Program specified in MDI mode has been executed completely.

[Related signals]

(1) Memory mode (MEM: YC08)

(2) Tape mode (T: YC09)

(3) MDI mode (D: YC0B)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
B	AUTOMATIC OPERATION "PAUSE" COMMAND (Feed hold)	*SP	YC11	YD51	YE91	YFD1	Y1111	Y1251	Y1391	Y14D1

[Function]

During automatic operation, axis motion can be decelerated and stopped with this command signal. To restart, press "Automatic operation "start" command" (ST) signal pushbutton.

[Operation]

(1) When "Automatic operation "pause" command" (*SP) signal turns OFF, automatic operation stops.
- During automatic operation, the operation stops. "In automatic operation "pause"" (SPL) occurs.
- Restart with the automatic start (ST) button. (Press after turning *SP signal.)

(2) In the following cases, automatic operation does not immediately stop.
- During tapping in fixed cycle.
  Automatic operation stops when tapping is completed and the tool returns to "R" point.
- During thread cutting.
  Automatic operation stops when a block for axis motion (other than thread cutting), which comes first after the "Automatic operation "pause" command" (*SP) signal turns OFF, is completed. If the "Automatic operation "pause" command" (*SP) signal remains OFF, however, automatic operation stops immediately after a block (other than thread cutting) is given.
- When control variable "feed hold invalid" has been set by user macro.Automatic operation stops immediately after a block where the control variable "feed hold invalid" is cleared starts.

(3) "Automatic operation "pause" command" (*SP) signal is valid even during machine lock.

[Related signals]

(1) Memory mode (MEM: YC08)
(2) Tape mode (T: YC09)
(3) MDI mode (D: YC0B)
(4) Automatic operation "start" command (ST: YC10)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SINGLE BLOCK	SBK	YC12	YD52	YE92	YFD2	Y1112	Y1252	Y1392	Y14D2

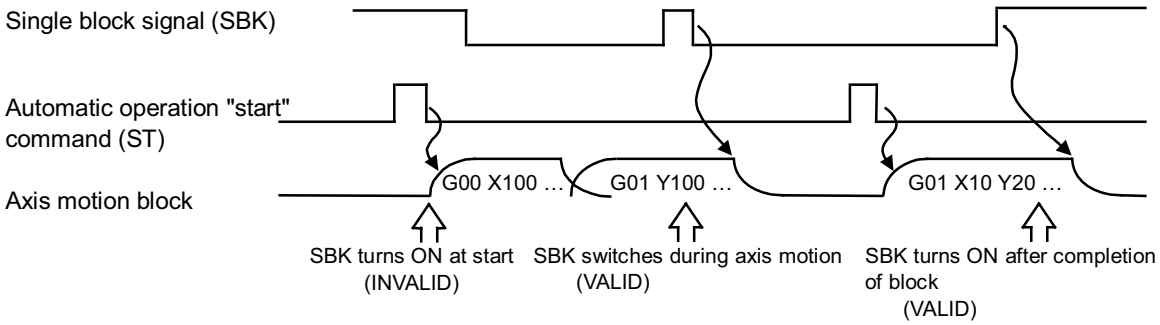
[Function]

Machining program can be executed block by block in automatic operation.

[Operation]

(1) When "Single block" signal (SBK) turns ON, operation of controller is as follows:
- During automatic operation
  After the block in execution has been completed, automatic operation stops. To start execution of the next block, "Automatic operation "start" command" (ST) must be turned ON to OFF.
- There will be no operation when automatic operation is not being executed but if automatic operation is started with the "Single block" signal (SBK) ON, one block will be executed and then will stop. This allows the commanded program to be executed one block at a time.

(2) If the "Single block" signal (SBK) is ON at the end of a block, operation will normally stop immediately. However, in the following case, operation will continue to where stopping is possible, and then will stop.
- During cycle operation such as a fixed cycle.
  The block where single block is being received will differ according to each cycle. Refer to the cycle sections in the Programming Manual.


Single block signal (SBK)
Automatic operation "start" command (ST)
Axis motion block
G00 X100 …
G01 Y100 …
G01 X10 Y20 …
SBK turns ON at start (INVALID)
SBK switches during axis motion (VALID)
SBK turns ON after completion of block (VALID)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
B	BLOCK START INTERLOCK	*BSL	YC13	YD53	YE93	YFD3	Y1113	Y1253	Y1393	Y14D3

[Function]

This signal prohibits start of the next block in automatic operation (memory, MDI or tape).

[Operation]

While the "Block start interlock" (*BSL) signal is OFF, execution of the next block may not be started in automatic operation. When the signal is given during execution of a block, the execution of the block continues until it is completed. Since the signal does not cause stop or suspension of automatic operation, execution of program starts when the "Block start interlock" (*BSL) signal turns ON.

(Note 1) This signal is valid to all blocks including blocks internally generated in controller by fixed cycle, etc.

(Note 2) The signal (*BSL) is ON when the power is turned ON. When the signal is not used, programming on the PLC is not required for this signal.

[Related signals]

(1) Cutting block start interlock (*CSL: YC14)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
B	CUTTING BLOCK START INTERLOCK	*CSL	YC14	YD54	YE94	YFD4	Y1114	Y1254	Y1394	Y14D4

[Function]

This signal prohibits start of an axis motion command block other than that for positioning in automatic operation (memory, MDI, tape).

[Operation]

While the "Cutting block start interlock" (*CSL) signal is OFF, execution of an axis motion command block other than that for positioning may not be started in automatic operation. When the signal is given during execution of a block, the execution of the block continues until it is completed.

Since the signal does not cause stop or suspension of automatic operation, execution of program starts when the "Cutting block start interlock" (*CSL) signal is turned ON.

(Note 1) This signal is valid to all blocks including blocks internally generated by fixed cycle, etc.

(Note 2) The signal (*CSL) is ON when the power is turned ON. When the signal is not used, programming on the PLC is not required for this signal.

[Related signals]

(1) Block start interlock (*BSL: YC13)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	DRY RUN	DRN	YC15	YD55	YE95	YFD5	Y1115	Y1255	Y1395	Y14D5

[Function]

Feedrate in automatic operation is specified by manually set value instead of program command value (F value).

[Operation]

(1) DRY RUN signal given during cutting feed
- When "Rapid traverse" (RT) signal is ON, the cutting feedrate is equal to the maximum cutting feedrate.In this case, "cutting feedrate override" and "rapid traverse override" are ignored.
- When "Rapid traverse" (RT) signal is OFF, the set manual feedrate (*JV1 to 16) will apply. Cutting feed override will also be valid if the "Manual override method selection" (OVSL) signal is ON.

(2) Dry run signal given during rapid traverse
- The parameter must be turned ON to validate dry run for rapid traverse (G0, G27, G28, G29, G30).
- When "Rapid traverse" (RT) signal is ON, the "Dry run" signal is ignored.
- When "Rapid traverse" (RT) signal is OFF, the speed is equal to manually set speed.

(Note 1) Dry run is not applicable to manual operation.

(Note 2) Dry run is valid even during G84 or G74 operation.

(3) Dry run during thread cutting
- Whether to enable or disable dry run during thread cutting is determined in "#1279 ext15/bit4 (Dry run OFF during thread cutting).
  When "#1279 ext15/bit4 (dry run OFF during thread cutting)" is "1", dry run is disabled. However, while the spindle OFF mode signal is ON, dry run is enabled regardless of the parameter, so the status of dry run is determined by the dry run signal.
- The feedrate by the dry run does not synchronize with the spindle rotation.
- The dry run signal is checked at the start off thread cutting. If the signal is changed during thread cutting, the change is ignored.

[Related signals]

(1) Manual feedrate code m (*JV1 to 16: YC70)

(2) Rapid traverse (RT: YC26)

(3) Manual override method selection (OVSL: YC59)

(4) Spindle OFF mode (YCD3)

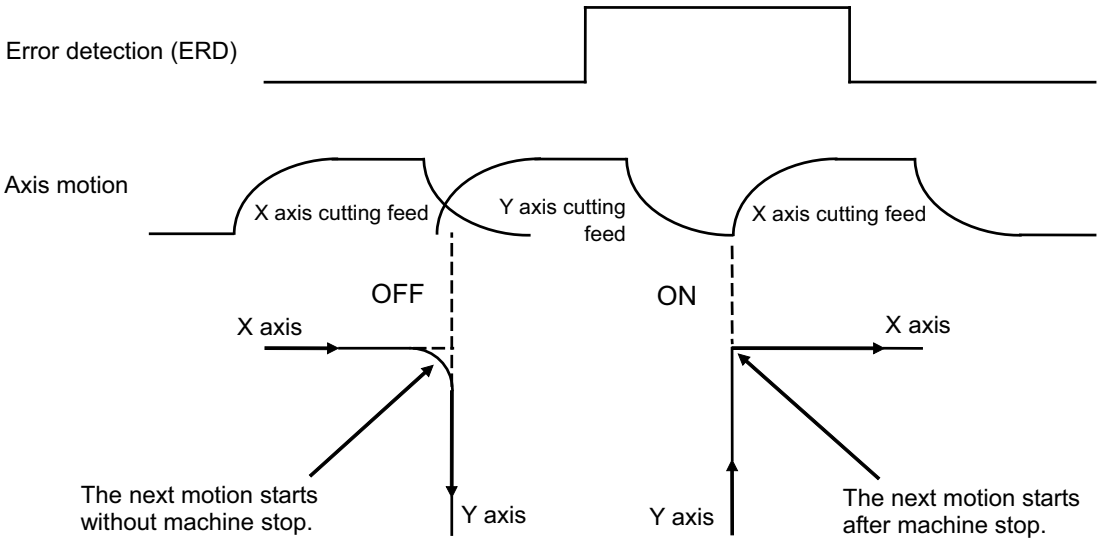
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	ERROR DETECTION	ERD	YC17	YD57	YE97	YFD7	Y1117	Y1257	Y1397	Y14D7

[Function]

Machine motion is stopped momentarily in transition from a cutting feed block to other block during automatic operation to provide time for determination whether in-position check is made or not before start of the next block.
Block-to-block transition may cause rounding in cutting because of delay caused by acceleration or deceleration, and servo response delay. Rounding can be eliminated by stopping the machine motion between the blocks by turning the "Error detection" signal (ERD) ON.

[Operation]

When this "Error detection" signal (ERD) is ON in block-to-block transition during cutting in automatic operation, in-position check is accomplished. If the signal is OFF, the next block starts after completion of the preceding block without stop.



(Note 1) In general practice, the signal (ERD) is turned ON and OFF using an appropriate miscellaneous function (M code, etc.) so that command program can determine whether machine motion should be stopped or not. When the signal is ON, the status is same as the case where G09 is specified by the command program. Consequently, it is recommended to use G function unless otherwise required especially.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NC RESET 1	NRST1	YC18	YD58	YE98	YFD8	Y1118	Y1258	Y1398	Y14D8

[Function]

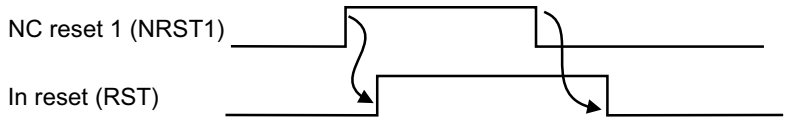
This signal is used to reset the control unit.

[Operation]

When this signal (NRST1) is turned ON, the control unit can be reset.

Generally, the signal for the reset button of the NC operation board is set to "NC reset 1" (NRST1). At this time, the control unit will take the following actions.

(1) The G command modal will be held.
(2) The tool compensation data will be held.
(3) The memory will be indexed.
(4) The error/alarm will be reset.
(5) The MST code output will be held.
(6) The M code independent output (M00, M01, M02, M30) will turn OFF.
(7) The axis movement will stop.
(8) The "In reset" signal (RST) will be output.



[Related signals]

(1) NC reset 2 (NRST2: YC19)
(2) Reset & rewind (RRW: YC1A)
(3) In "reset" (RST: XC15)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	NC RESET 2	NRST2	YC19	YD59	YE99	YFD9	Y1119	Y1259	Y1399	Y14D9

[Function]

This signal is used to reset the control unit.

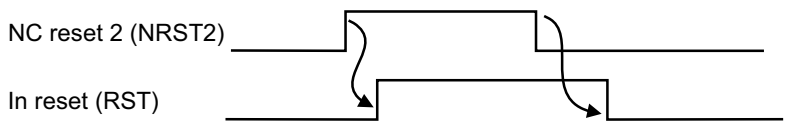
[Operation]

When this signal (NRST2) is turned ON, the control unit can be reset.

Generally, this is turned ON when the miscellaneous function M02 or M30 is executed. In some cases, the "Reset & Rewind" (RRW) explained later is used.

At this time, the control unit will take the following actions.

(1) The G command modal will be initialized.
(2) The tool compensation data will be canceled. (Will not be applied.)
(3) The memory will not be indexed.
(4) The error/alarm will be reset.
(5) The MST code output will be held.
(6) The M code independent output (M00, M01, M02, M30) will turn OFF.
(7) The axis movement will stop.
(8) The "In reset" signal (RST) will be output.



[Related signals]

(1) NC reset 1 (NRST1: YC18)
(2) Reset & rewind (RRW: YC1A)
(3) In "reset" (RST: XC15)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	RESET & REWIND	RRW	YC1A	YD5A	YE9A	YFDA	Y111A	Y125A	Y139A	Y14DA

[Function]

This signal resets the controller.

During memory operation, the head of the machining program currently being run can be called out.

The reset key in the communication terminal is also set to YC1A by the sequence program.

[Operation]

When this signal (RRW) turns ON:

(1) Ongoing axis motion is decelerated and stopped.

(2) CNC is reset after axis motion stops. In about 0.5 second after CNC is reset, "In reset" signal (status signal RST) turns ON.

(3) At the same time as CNC is reset, "In rewind" (RWD) signal turns ON.
- In memory operation mode, the head of program in execution is read (memory index).

(4) While the signal (RRW) is ON, automatic operation and manual operation are impossible.

(5) G command modal is initialized.

(6) Tool compensation (offset) data are canceled (no motion).

(7) Error/alarm is reset.

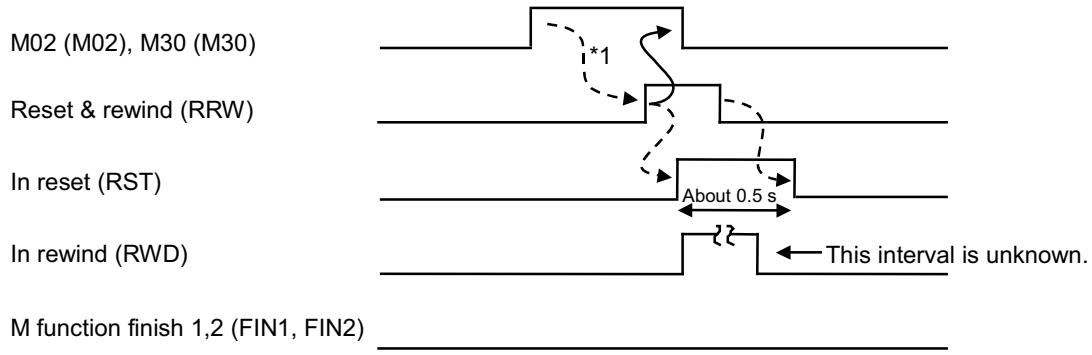
(8) M, S, T code outputs are held. (Strobe signal turns OFF.)

(9) M code independent output (M00, M01, M02 and M30) is turned OFF.

<Operation example>

The process when M02 or M30 are commanded in the program is shown below.

Generally, when M02 (or M30) is executed by the program, this signal (RRW) will be returned when the designated operation is completed. M function finish 1 (FIN1) and M function finish 2 (FIN2) will not be returned.(Refer to *1 in the following drawing.)



[Related signals]

(1) In reset (RST: XC15)

(2) In rewind (RWD: XC17)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
B	CHAMFERING	*CDZ	YC1B	YD5B	YE9B	YFDB	Y111B	Y125B	Y139B	Y14DB

[Function]

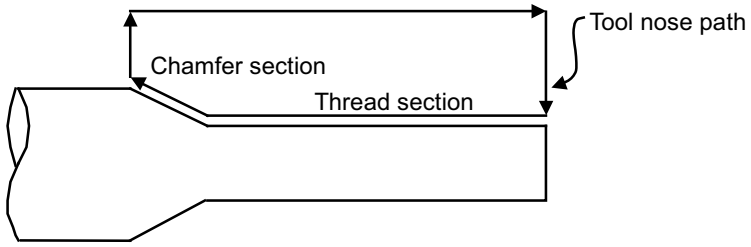
In thread cutting cycle, chamfering can be ignored.

[Operation]

Status of this signal is determined at start of thread cutting cycle.

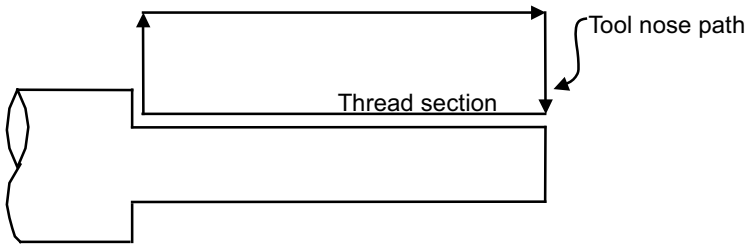
- CHAMFERING (*CDZ) is OFF.

  Chamfering (at end of thread cutting) is accomplished.



- CHAMFERING (*CDZ) is ON.

  Chamfering is not accomplished (signal is ignored).



Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	AUTOMATIC RESTART	ARST	YC1C	YD5C	YE9C	YFDC	Y111C	Y125C	Y139C	Y14DC

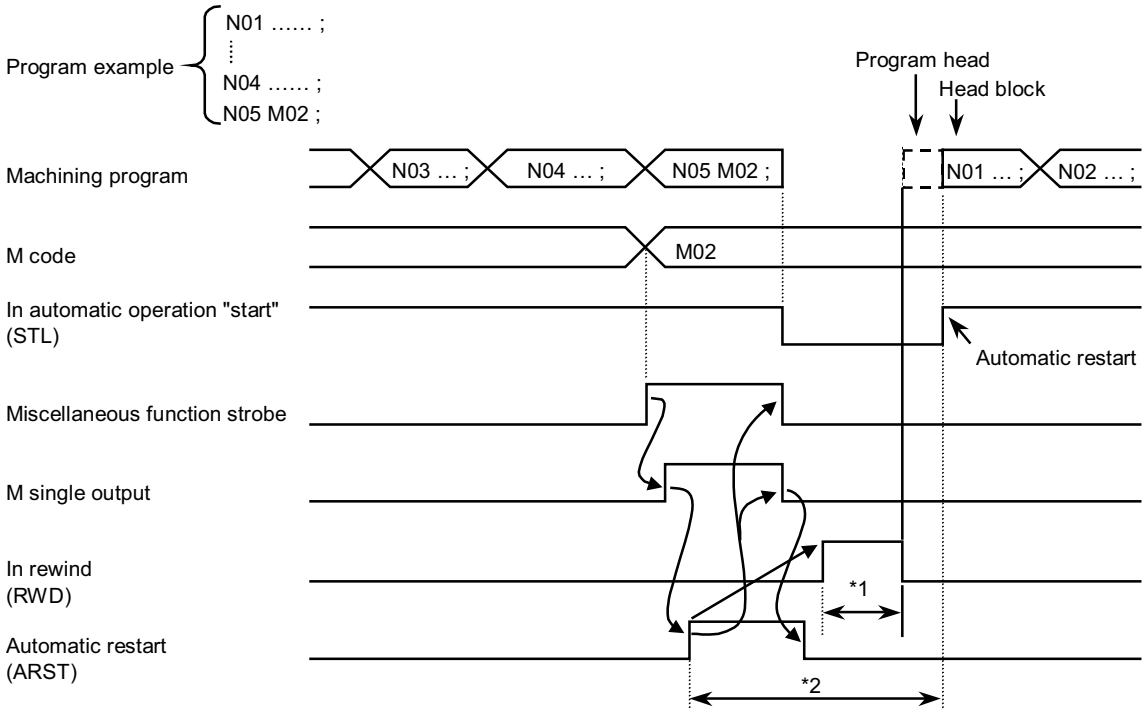
[Function]

If this signal is turned ON after the end of the machining program execution, the same machining program will be restarted.

[Operation]

The same machining program will restart if this signal is turned ON during automatic start.

[Timing chart]



*1:Rewind time During memory operation …approx. 0.1 [s] + α (α is the PC cycle time)
During tape operation …according to length of tape
*2:Refer to Note 8.

(Note 1) The modal is initialized with this signal.
(Note 2) This signal is valid only during automatic start.
(Note 3) This signal is valid during the memory and MDI automatic operation modes.
(Note 4) Normally, "M code independent output" signal for M02 or M30 is input into this signal, but in this case, do not input the M02 or M30 completion signal (FIN1, FIN2).
(Note 5) If the "Automatic operation "pause" command" (*SP) signal is valid, the "Automatic restart" signal will be invalid.
(Note 6) This signal is invalid during single block stop.
(Note 7) Note that if an M command other than M02 or M30 is input into this signal, the program will return to the start point without completing the program, and the program will be restarted.
(Note 8) If "Reset & rewind" (RRW) are applied during the automatic restart process (*2 section in time chart above), the modal will be initialized and the tape will be rewound, but the "Automatic restart" signal will be invalid.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M FUNCTION FINISH 1	FIN1	YC1E	YD5E	YE9E	YFDE	Y111E	Y125E	Y139E	Y14DE

[Function]

This status signal informs the controller that specified miscellaneous (M) function, spindle (S) function, tool (T) function or 2nd miscellaneous function (A, B or C) is accomplished on the PLC side.

[Operation]

If the M, S, T or 2nd M function command is executed during automatic operation, the code and each function strobe (MF1 to 4, SF1 to 4, TF1 to 4, BF1 to 4) will turn ON.

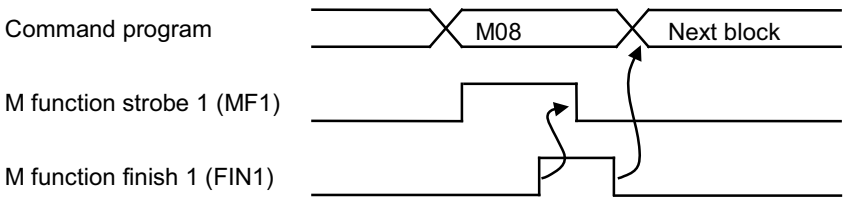
When the PLC verifies that one or more M, S, T and/or B function has been specified, it performs that function(s) and, after completion of the function(s), "M function finish 1" (FIN1) signal turns ON.

When the controller verifies that signal FIN1 turns ON, it turns OFF strobe signal of corresponding function.

The PLC checks that each strobe signal turns OFF, then turns OFF FIN1.

With the signal FIN1 turned OFF, the controller proceeds to the next block.

An example of timing chart, where M function is specified, is as follows:



There are two "M function finish" signals, namely, "M function finish 1" and "M function finish 2" (refer to the next page). The only difference is if the next block is proceeded to at the falling edge or at the rising edge. These can be used separately per operation in one PLC.

(Note 1) "M function finish 1" (FIN1) signal is common to M, S, T and B functions.

(Note 2) The "M function finish 1" signal is also the signal for upgrading the spindle speed output (S command data, etc.) during S function execution.

(Note 3) If signal FIN1 has been ON before M, S, T or B function is specified, data pertinent to M, S, T or B function are not output. To output, the signal FIN1 should be turned OFF once.

(Note 4) When "Reset & rewind" (RRW) signal is sent to the controller by M02 or M30, "M function finish 1 or 2" signal should not be sent back. If the "M function finish 1 (2)" signal is return with the M02 command at the end of the machining program, the NC alarm program error (P36) will occur.

(Note 5) This signal is not used when the high-speed method (parameter "#1278 ext14/bit1"= "1").

[Related signals]

(1) M function finish 2 (FIN2: YC1F)
(2) M function strobe 1 to 4 (MF1 to 4: XC60)
(3) S function strobe 1 to 4 (SF1 to 4: XC64)
(4) T function strobe 1 to 4 (TF1 to 4: XC68)
(5) 2nd M function strobe 1 to 4 (BF1 to 4: XC6C)
(6) M, S, T, B function data (output to file register R: R504 and later)
(7) Reset & rewind (RRW: YC1A)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	M FUNCTION FINISH 2	FIN2	YC1F	YD5F	YE9F	YFDF	Y111F	Y125F	Y139F	Y14DF

[Function]

This status signal informs the controller that specified miscellaneous (M) function, spindle (S) function, tool (T) function or 2nd miscellaneous function (A, B or C) is accomplished on the PLC side. When too much signals FIN1 must be used, this signal can be used instead of signal FIN1 to save time.

[Operation]

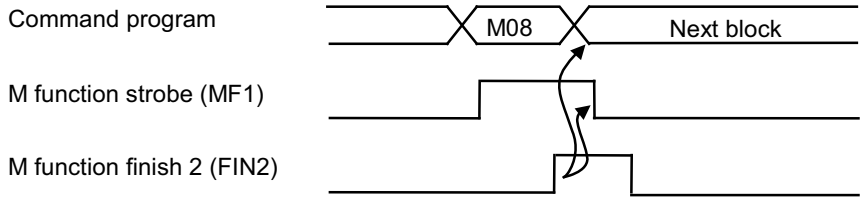
If the M, S, T or 2nd M function command is executed during automatic operation, the code and each function strobe (MF1 to MF4, SF1 to 4, TF1 to 4, BF1 to BF4) will turn ON.

When the PLC verifies that one or more M, S, T and/or 2nd M function has been specified, it performs that function(s) and, after completion of the function(s), "M function finish 2 (FIN2)" signal turns ON.

When the controller verifies that signal FIN2 turns ON, it turns OFF strobe signal of corresponding function.

When each strobe signal turns OFF, the PLC turns OFF signal FIN2. With the signal FIN2 turned OFF, the controller proceeds to the next block.

An example of timing chart, where M function is specified, is as follows:



There are two types of M function finish signals, namely, "M function finish 1" (refer to the previous page) and "M function finish 2". The only difference is if the next block is proceeded to at the falling edge or at the rising edge. These can be used separately per operation in one PLC.

(Note 1) "M function finish 2 (FIN2)" signal is common to M, S, T and B functions.

(Note 2) The M function finish 2 signal is also the signal for upgrading the spindle speed output (S analog data, etc.) during S function execution.

(Note 3) If signal FIN2 has been ON before M, S, T or B function is specified, data pertinent to M, S, T or B function are not output.

(Note 4) When "Reset & rewind" signal (RRW) is sent to the controller by M02 or M30, "M function finish" 2 or 1 signal should not be sent back. If the "M function finish 2 (1)" signal is return with the M02 command at the end of the machining program, the NC alarm program error (P36) will occur.

(Note 5) This signal is not used when the high-speed method (parameter "#1278 ext14/bit1"= "1").

[Related signals]

(1) M function finish 1 (FIN1: YC1E)
(2) M function strobe 1 to 4 (MF1 to 4: XC60)
(3) S function strobe 1 to 4 (SF1 to 4: XC64)
(4) T function strobe 1 to 4 (TF1 to 4: XC68)
(5) 2nd M function strobe 1 to 4 (BF1 to 4: XC6C)
(6) M, S, T, B function data (output to file register R: R504 and later)
(7) Reset & rewind (RRW: YC1A)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LENGTH MEASUREMENT 1	TLM	YC20	YD60	YEA0	YFE0	Y1120	Y1260	Y13A0	Y14E0

[Function]

"Tool length manual measurement 1" is selected by this signal.

For M system, "Tool length manual measurement 1 and 2" functions are used by this signal.

[Operation]

When the signal (TLM) is turned ON (1), amount of tool length to be corrected is calculated automatically in the controller.

[Caution]

(1) This signal is invalid if the tool length screen is not selected.

(2) The calculation result is read when INPUT key is pressed.

(3) Turn this signal OFF before executing a program with manual speed command.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LENGTH MEASUREMENT 2	TLMS	YC21	YD61	YEA1	YFE1	Y1121	Y1261	Y13A1	Y14E1

[Function]

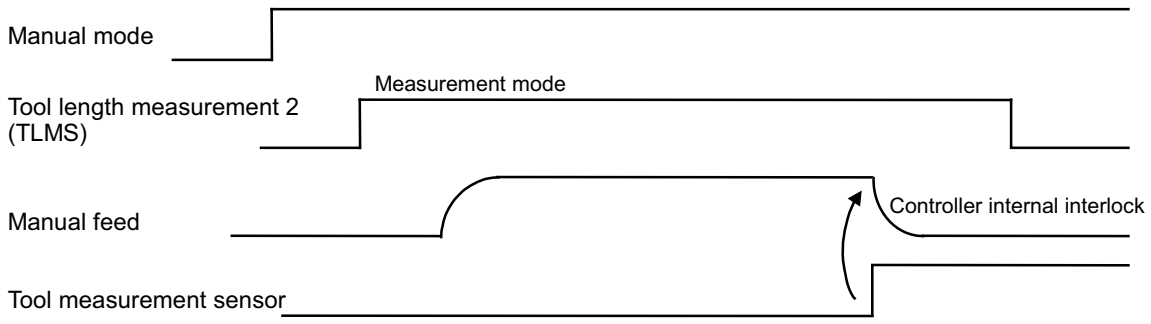
"Tool length measurement 2" is selected by this signal.

[Operation]

When the signal (TLMS) is turned ON, calculation of tool length compensation amount is automatically started in the controller.

When skip signal is input during tool length measurement, amount of tool length to be corrected is calculated.

[Timing chart]



[Caution]

(1) To use the tool length measurement 2 function, select manual operation mode.
Otherwise, tool length measurement mode cannot be established.

(2) "Tool length measurement 2" can be used with a machine equipped with tool measurement sensor.
The sensor for tool length measurement is connected to the connector "SENSOR" No. 2 pin ON the controller unit.

(3) The calculation result is read automatically inside the controller.

(4) With tool length measurement 2, multiple part systems cannot be measured simultaneously.

[Related signals]

(1) Tool length measurement 2 Tool No. (R2618)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SYNCHRONIZATION CORRECTION MODE	SYCM	YC22	YD62	YEA2	YFE2	Y1122	Y1262	Y13A2	Y14E2

[Function]

When the "M01 OPERATION ERROR 0051" (Synchronization error too large) occurs, the occurring error is corrected without changing the operation method with this mode.

[Operation]

In the correction mode, the operation is as follows.

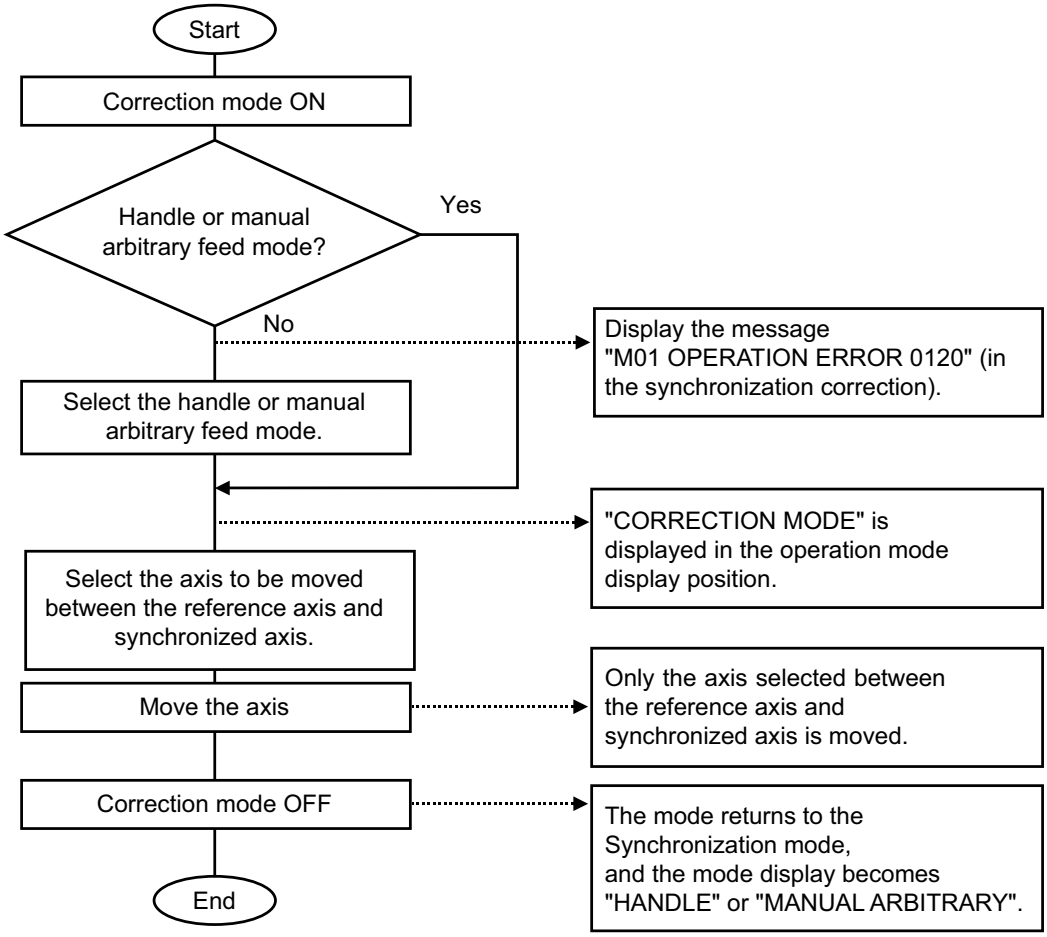
(1) The synchronous control is not carried out even in the synchronized axis, and the reference axis and synchronized axis are handled as independent two axes in the each control part. Thus, the reference axis and synchronized axis can be moved individually.

(2) If the zero point has established, the synchronization error check is carried out.

(3) If the correction mode switch is turned ON during selecting the mode except the handle or manual arbitrary feed mode, the "M01 OPERATION ERROR 0120" (Synchronization correction mode ON) will occur.

In the handle or manual arbitrary feed mode, if the correction mode switch is turned ON, the correction mode can be set and "CORRECTION MODE" will be displayed in the operation mode display position.

The operation procedure is shown below.


Start
Correction mode ON
Handle or manual arbitrary feed mode?
Yes
No
Display the message "M01 OPERATION ERROR 0120" (in the synchronization correction).
Select the handle or manual arbitrary feed mode.
"CORRECTION MODE" is displayed in the operation mode display position.
Select the axis to be moved between the reference axis and synchronized axis.
Move the axis
Only the axis selected between the reference axis and synchronized axis is moved.
Correction mode OFF
The mode returns to the Synchronization mode, and the mode display becomes "HANDLE" or "MANUAL ARBITRARY".
End

[Related signals]

(1) Synchronous control operation method (R2589)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	PROGRAM RESTART	PRST	YC23	YD63	YEA3	YFE3	Y1123	Y1263	Y13A3	Y14E3

[Function]

With the program restart function, when the axis is returned to the restart position with the manual mode after the restart search is performed, the direction can be checked, or the axis can be stopped at the restart position.

[Operation]

If the "Program restart" signal (PRST) is turned ON after the restart search is performed and the axis is moved to the restart position direction with the manual mode, the axis is stopped at the restart position automatically. The [RESTART-R] values on the program restart screen are set to zero and "RP" appears by the side of the [RESTART-P] values. If the axis is moved in the opposite direction to the restart position, an OPERATION ERROR will occur.

[RESTART – (G54)]		[RESTART – R]	
X	- 130.000RP	X	0.000
Y	-10.000RP	Y	0.000
Z	0.000RP	Z	0.000

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	PLAYBACK	PB	YC24	YD64	YEA4	YFE4	Y1124	Y1264	Y13A4	Y14E4

[Function]

This signal is used to convert amount of axis motion into controller command data for generation of operation program.

[Operation]

When the "Playback" (PB) signal turns ON, the playback display mode appears on the communication terminal. By moving and stopping axis motion components (tool or table) with JOG feed, rapid traverse or handle feed, the displayed coordinate value is read and converted into NC data in accordance with the operation program format. By repeating data read, an operation program can be created.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MACRO INTERRUPT	UIT	YC25	YD65	YEA5	YFE5	Y1125	Y1265	Y13A5	Y14E5

[Function]

When the controller is ready for user macro interrupt, the program being in execution can be interrupted, or other program can be executed after the former program has been executed, by turning ON "Macro interrupt" (UIT) signal.

[Operation]

When "Macro interrupt" (UIT) signal turns ON within time interval starting with M96 command(Note 1) and ending with M97 command or reset, the program being in execution can be interrupted for execution of other program.

"Macro interrupt" (UIT) signal becomes valid when:

(1) Memory, tape or MDI is selected.
(2) Automatic operation is selected (signal STL is ON).
(3) Other user macro is not being executed.

"Macro interrupt" (UIT) signal is accepted in "status trigger" method or "edge trigger" method, either one of which can be selected by parameter #1112.

(1) Status trigger method

While "Macro interrupt" (UIT) signal is ON, the signal can be accepted.

When M96 is used to make acceptable user macro interrupt, the inserted program is executed when the signal (UIT) turns ON.

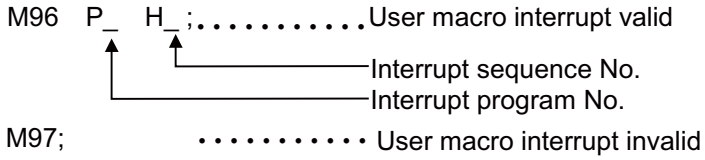
With the signal (UIT) kept turned ON, inserted program can be executed repeatedly.

(2) Edge trigger method

The signal (UIT) is accepted when its status changes from "OFF" to "ON" (i.e., with rise edge of signal).

This method is advantageous when inserted program is executed only once.

<Command format>



Refer to the relevant Programming Manual for details on the user macro interrupt function such as interrupt method and call method for when the "Macro interrupt" (UIT) signal is ON.

(Note 1) M96 and M97 can be changed to other M code by using a parameter.

(Note 2) User macro interrupt control M code is processed internally and not output to an external source (PLC).

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	RAPID TRAVERSE	RT	YC26	YD66	YEA6	YFE6	Y1126	Y1266	Y13A6	Y14E6

[Function]

Speed or feedrate of axis motion in "JOG" mode, "incremental feed" mode or "reference position return" mode can be changed to rapid traverse speed.

[Operation]

When the signal (RT) is turned ON:

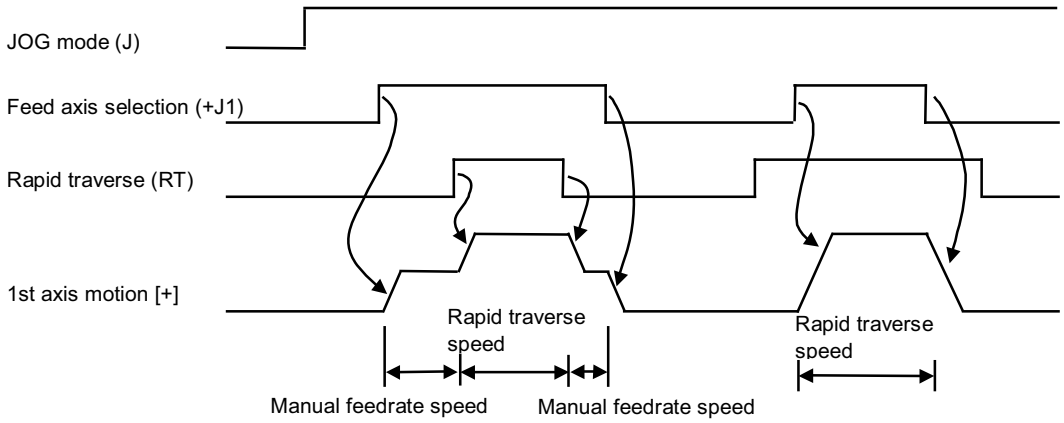
(1) The jog and incremental feedrate will be the rapid traverse feedrate set with parameters.

(2) The speed until the near-point detection dog signal is detected during dog-type reference position return will be the reference position return rapid traverse feedrate set with parameters.

(3) Speed or feedrate is changed at the same time as the signal is turned ON.When the signal (RT) is turned OFF, rapid traverse speed changes to the previous speed or feedrate. "Feed axis selection" signal (±J1 to 8) may be kept turned ON.

(4) The speed will be the rapid traverse feedrate until the near point dog signal is detected during jog, incremental feed or reference position return. The rapid traverse override will also be valid.

(5) The "Rapid traverse override code 1,2" (ROV1, ROV2) will be validated when the "Rapid traverse" signal is ON.



(Note 1) "Rapid traverse" (RT) signal does not act as mode signal, but serves as interrupt signal for "JOG" mode, "INCREMENTAL FEED" mode, etc.

(Note 2) This signal can be used likewise during machine lock.

(Note 3) For handling of "Rapid traverse" (RT) signal during dry run, refer to the description about dry run signal (DRN).

[Related signals]

(1) Rapid traverse override code 1,2 (ROV1, ROV2: YC68, YC69)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	REVERSE RUN	VRV	YC27	YD67	YEA7	YFE7	Y1127	Y1267	Y13A7	Y14E7

[Function]

This signal is used to select reverse/forward run in the arbitrary reverse run.

[Operation]

Forward run is executed when this signal is OFF.

Reverse run is executed when this signal is ON.

This signal is available only in the reverse run control mode.

[Related signals]

(1) Reverse run from block start (RVSP: YD08)

(2) Macro interrupt priority (RVIT: YD09)

(3) Reverse run control mode (RVMD: YD0A)

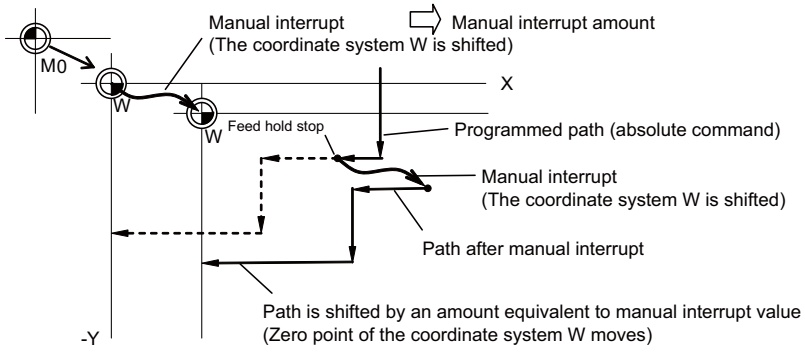
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ABSOLUTE	ABS	YC28	YD68	YEA8	YFE8	Y1128	Y1268	Y13A8	Y14E8

[Function]

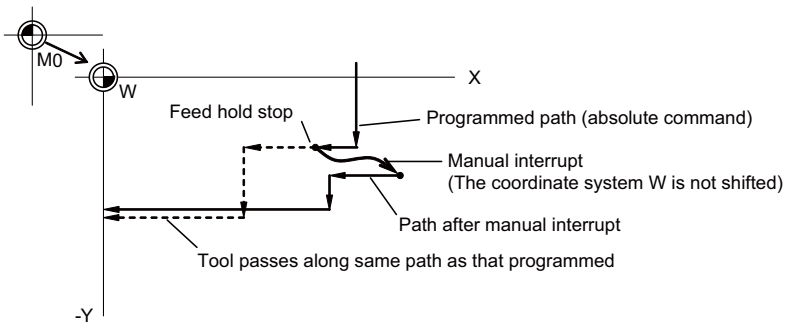
This signal selects whether to update the program coordinate system the amount moved with manual operation (jog, handle, etc.).

[Operation]

(1) When "Manual absolute" signal (ABS) is OFF:
The amount moved with manual operation is not added to the absolute position register in the controller. Thus, if manual is used during automatic operation, the axis will move in parallel the amount moved manually at the end point of the block and the end point of the following blocks. (The axis will move in parallel regardless of the absolute/ incremental command in the machining program.)



(2) When "Manual absolute" signal (ABS) is ON:
The amount moved by manual operation is added to the absolute position register in the controller, and the coordinate system is not changed. Thus, if manual operation is used during automatic operation by absolute command, the axis will return to the position commanded at the end of the inserted block and following blocks. However, if the manual interrupt is an incremental command, the axis will move in parallel the amount moved manually. (The axis will move in parallel regardless of the absolute/incremental command at the end of the inserted block.)



Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	DISPLAY LOCK	DLK	YC29	YD69	YEA9	YFE9	Y1129	Y1269	Y13A9	Y14E9

[Function]

By using this signal, the current position displayed on the display unit is not updated even if the machine is moved with automatic operation or manual operation.

[Operation]

When the display lock signal (DLK) is ON, the machine movement and program coordinate system are updated in the normal state, but the current position displayed on the display unit is locked.

(Note 1) This signal (DLK) is valid at all times, and can be turned ON and OFF immediately.

(Note 2) This signal is valid during machine lock operation.

[Related signals]

(1) In display lock (DLKN: XC29)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	F1-DIGIT SPEED CHANGE VALID	F1D	YC2A	YD6A	YEAA	YFEA	Y112A	Y126A	Y13AA	Y14EA

[Function]

When this signal is ON and F1-digit feed is commanded, the feedrate registered in the parameters can be increased or decreased by turning the manual handle.

[Operation]

When the program feedrate is commanded with an F1-digit, the feedrate can be increased or decreased by turning the manual handle.

(1) Speed fluctuation amount using manual handle

The speed fluctuation amount DF is expressed with the following expression.

$\Delta F = \Delta P \times (FM/K)$

ΔP: Handle pulse (±)

FM : Upper limit value for F1-F5 (parameter setting value #1506)

K : Speed fluctuation constant (parameter setting value #1507)

(Example) To increase/decrease by 10mm/min per handle feed scale

When FM 3600mm/min is set,

K =360 based on the following expression: $\Delta F = 10 = 1 \times (3600/K)$

(2) Validity conditions

(a) Automatic operation must be active.

(b) Automatic operation must be started.

(c) The operation must be in cutting feed, and the F1-digit feedrate must be designated.

(d) The F1-digit valid parameter must be ON.

(e) The F1-digit speed change valid signal must be ON.Machine lock must not be active.Dry run must not be active.

[Related signals]

(1) F1-digit commanded (F1DN: XC2A)

(2) F1-digit No. code (F11 to F18: XC30 to XC33)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	RECALCULATION REQUEST	CRQ	YC2B	YD6B	YEAB	YFEB	Y112B	Y126B	Y13AB	Y14EB

[Function]

This signal is turned ON if a calculated block (next block) is recalculated during operation of the machining program.

[Operation]

For example, to operate mirror image, etc., with the miscellaneous (M) command in the program.

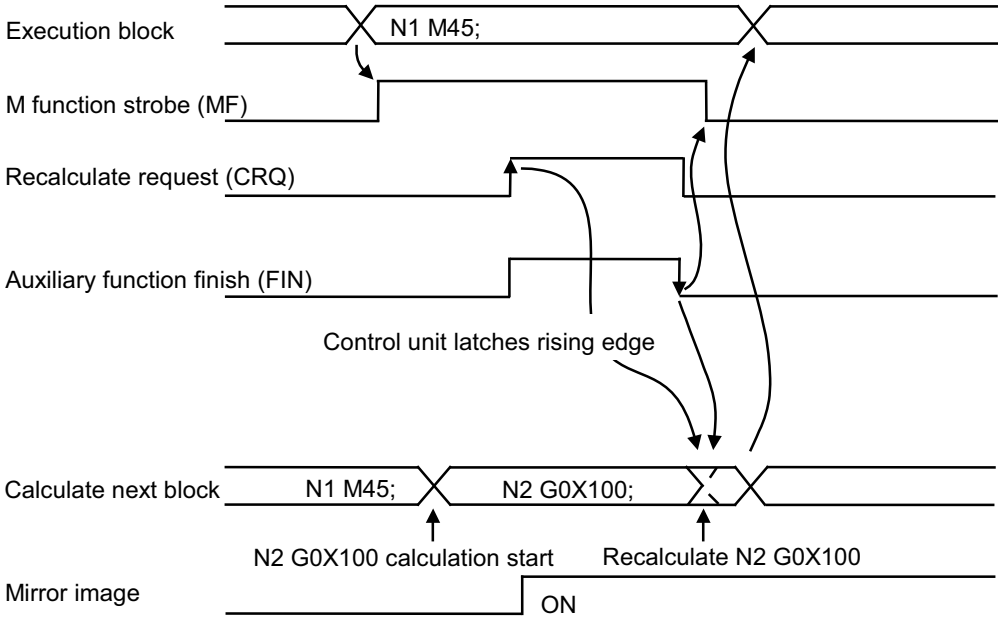
:

N1 M45; To apply mirror image with this M command

N2 G0X100;

:

When the N1 block is reached in the above program example, the "Recalculate request" signal will turn ON before FIN is output or simultaneously with FIN. This will validate the mirror image from the N2 block.



[Caution]

The "Recalculation request" (CRQ) signal latches the rising edge in the controller. Thus, even if the "Recalculation request" (CRQ) signal is ON (1), the "recalculation" will not take place unless at the rising edge.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	PLC EMERGENCY STOP	QEMG	YC2C	YD6C	YEAC	YFEC	Y112C	Y126C	Y13AC	Y14EC

[Function]

The controller can be set to emergency stop condition, like the case where emergency stop signal is given by user PLC.

[Operation]

Emergency stop occurs in the controller when the signal (QEMG) is turned ON. In this case, "Servo ready completion (SA)" is turned OFF.

(Note) Since this signal is processed in software, response is somewhat slower, as compared with external emergency stop signal. Approximate response is equal to 1 scan by user PLC plus 100ms.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	REFERENCE POSITION RETRACT	RTN	YC2D	YD6D	YEAD	YFED	Y112D	Y126D	Y13AD	Y14ED

[Function]

This function returns immediately to a set reference position when the return signal is input. This function is used to return to a set position for changing the tool.

[Operation]

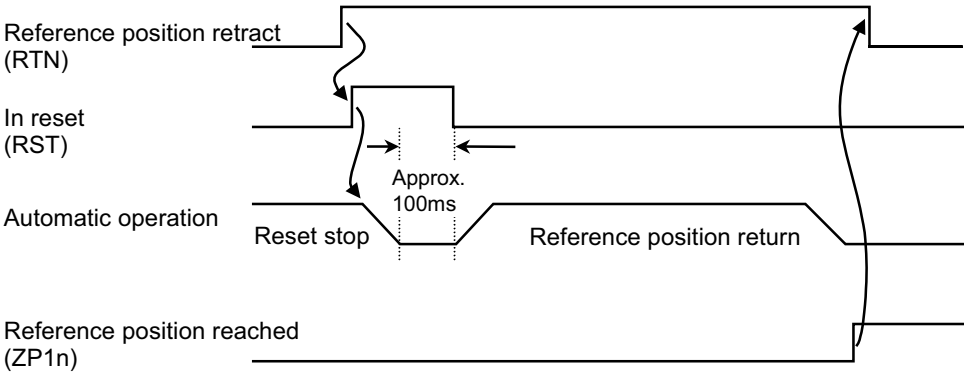
Reference position return is executed when this signal is turned ON. At the rising edge of the signal, the program is automatically reset (reset & rewind) and then reference position return is executed.

During the automatic or MDI operation, the operation is interrupted and stopped by the reset, and reference position return is executed.

If this signal is input during execution of a tap cycle in the automatic or MDI operation modes, the "Tap retract possible" signal will be output by the reset interruption, and the return operation will be the tap retract operation. The tap retract is completed at the initial point, and after that the reference position return will be carried out.

(1) If there are two or more axes, set the return order with parameter "#2019 revnum".
(2) When the reference position is reached, the corresponding "Reference position reached" signal will be output.
(3) This signal must be held until the "Reference position reached" signal is output. If it is turned OFF midway, the return operation will be interrupted and stop. If the signal is input again, the operation will restart from execution of resetting.
(4) The reference position return speed is handled in the same manner as the normal reference position return speed.
(5) The reference position returned to during reference position retract depends on the YC90 and YC91 reference position selection code 1,2.
(6) Even if the return signal is input during the thread cutting cycle, it will be invalid. However, if the return signal is executed in a block other than the thread cutting block, the return operation will be executed.
(7) The return signal is invalid if the coordinate system is not established. An alarm "M01 Ref point retract invalid" will occur when the return signal is input.

[Timing chart]



[Related signals]

(1) Tap retract possible (TRVE: XCA5)
(2) Tap retract (TRV: YC5C)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	PLC INTERRUPT	PIT	YC2E	YD6E	YEAE	YFEE	Y112E	Y126E	Y13AE	Y14EE

[Function]

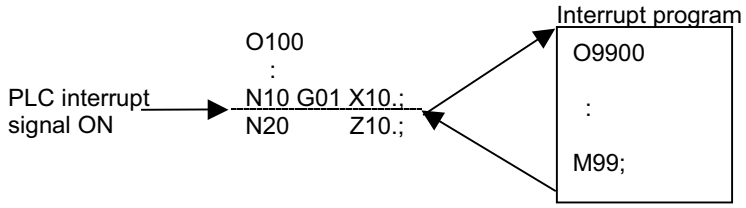
Interruption is executed with the interrupt program set with the R register when a signal is issued from the PLC during single block stop in automatic operation, or not in the automatic operation.

[Operation]

PLC interrupt categorized as "start during the automatic operation" and "start with other mode" and some operations differ. If it is in automatic operation is determine by whether the "In automatic operation" signal (OP) is output.

(1) Operation when the interrupt starts during the automatic operation
Following operation is performed when this signal is turned ON at a single block stop during the automatic operation.

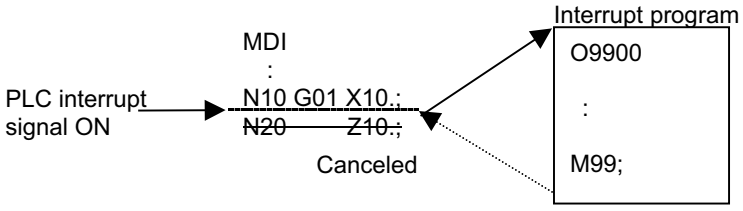
<Operation example>
(Example 1) When program is interrupted during memory operation single block stop



After the O100 N10 block ends, the designated interrupt program (O9900) is called when this signal turns ON. The PLC interrupt ends at the M99 block, and the block will stop. (When the block stops, it is possible to turn this signal ON and then execute the PLC interruption again.)O100 N20 is executed from the next automatic start.

(Note 1) The PLC interruption is not executed if this signal is turned ON while the automatic operation is activated. The alarm "M01 PLC interruption impossible 0129" will occur. Cancel the alarm by turning OFF or reset the PLC interruption signal.

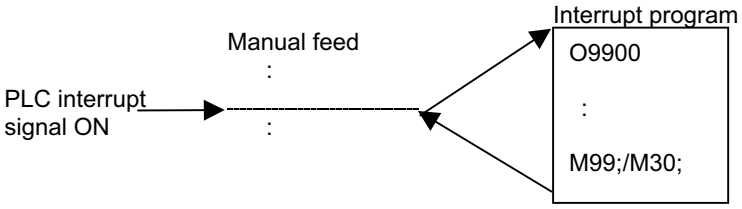
(Example 2) When program is interrupted during MDI operation single block stop



After the MDI N10 block ends, the designated interrupt program (O9900) is called when this signal is turned ON. The PLC interrupt ends at the M99 block, and the block will stop. The next and subsequent blocks of the MDI program are canceled so operation cannot be continued.

(2) Operation when the interruption starts during other than automatic operation
Following operation is performed if this signal is turned ON when the machine is in manual mode such as jog mode or handle mode etc. or when the machine is not in program operation even it is in the memory mode.

<Operation example> When program is interrupted during manual mode



During manual feed, the designated interrupt program (O9900) is called when this signal turns ON. The PLC interruption will be reset and finished at the M99 block, and the machine enters into the manual mode.

(Note 1) To turn this signal ON during the manual mode, use the manual/automatic simultaneous function concurrently.
(Note 2) Interrupt program is finished at M99 and reset 1 is input automatically.

[Caution]

(1) Single block operation and automatic operation pause are valid even when the interrupt program is executed. To invalidate single block during the interrupt program execution, set system variable #3003. To invalidate automatic operation pause, set system variable #3004.
(2) Other PLC interrupt and MDI interrupt cannot be commanded during execution of the interrupt program.
(3) To disable the display of the interrupt program being executed on the Monitor screen, set the basic specification parameter "#1122 pglk_c" to 1 or 2.
(4) The PLC interrupt signal is ignored even if it is turned ON during automatic operation start or automatic operation pause.
(5) "In automatic start" signal (OP) is output while the interrupt program is executed regardless of the operation mode which is active before the interruption.
(6) PLC interrupt is valid for each part system.
(7) If PLC interrupt is executed when there is no interrupt program or when program search has not been executed, a program error (P232) will occur when M99 is commanded.
(8) If the interrupt program No. set in the R register is not within the setting range, a program error (P232) will occur.
(9) Cancel the program error (P232) with reset.
(10) This function is an option. If the option is not provided, the PLC interrupt signal will be ignored even if it is commanded.
(11) The interruption is not executed in the part system where the PLC interrupt signal is OFF.
(12) "In automatic operation "run"" signal (OP) and "In automatic operation "start"" signal (STL) are output during the PLC interrupt program execution.
Likewise, they are output during the PLC interrupt program execution in other than automatic operation.

[Related signals]

(1) PLC interrupt program No. (R2518)
(2) In PLC interrupt (PCINO: XC35)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CHOPPING	CHPS	YC30	YD70	YEB0	YFF0	Y1130	Y1270	Y13B0	Y14F0

[Function]

This signal validates the chopping function.

[Operation]

The chopping mode is entered at the rising edge of this signal.

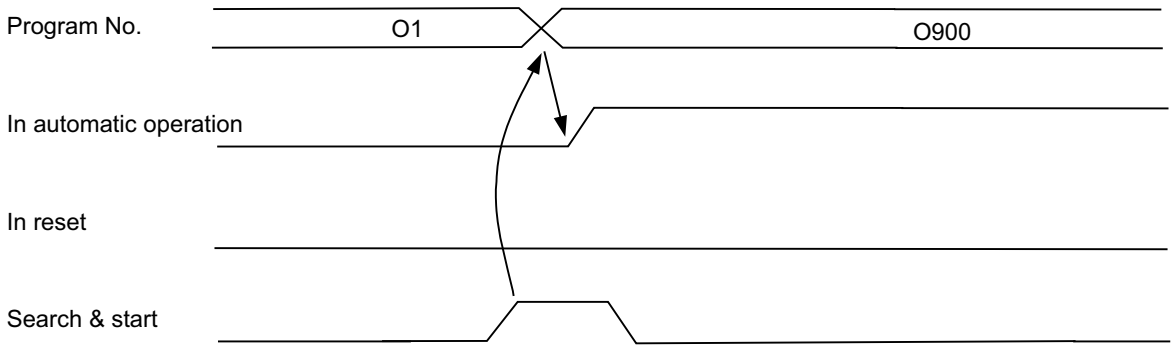
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SEARCH & START	RSST	YC31	YD71	YEB1	YFF1	Y1131	Y1271	Y13B1	Y14F1

[Function]

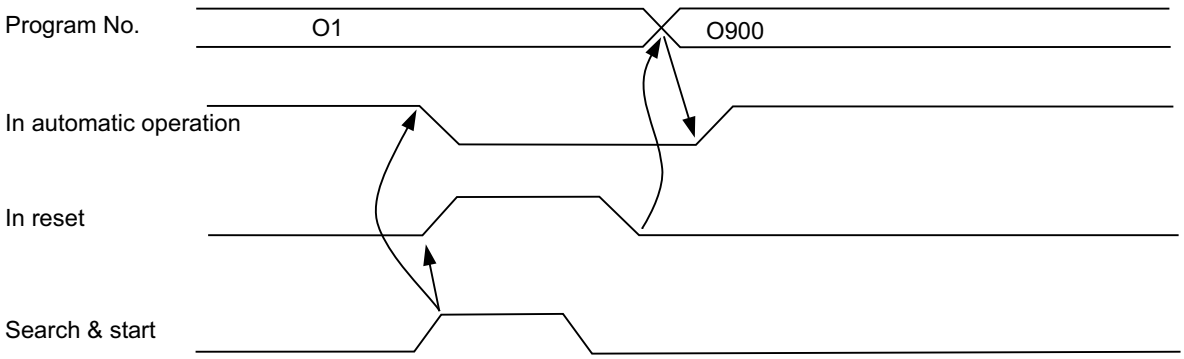
This signal is input into the controller when executing operation search in the memory mode and carrying out automatic start up.

[Operation]

If this signal is input when the memory operation mode is selected, an operation search of the machining program with the designated No. (R2562, R2563) will be carried out. After the search, the program will be automatically started.
If this signal is input during automatic operation, the program will be reset before the search. After the resetting is completed, the search and automatic start operations will be executed.
(Example1) Search & start is executed by designating O900 machining program from the reset state.



(Example2) When O900 machining program is designated during operation of the O1 machining program, and search & start is executed.



[Caution]

(1) This signal is valid only when the memory mode is selected.
(2) An error signal will be output if the machining program No. is not designated or if the designated program No. is illegal (0 or exceeding 99999999).
(3) This signal is valid at the rising edge.
(4) If this signal is input during resetting, the search & start will not be executed.
(5) When the multi-part system program management is valid, the search is executed for all part systems in batch with the signal for $1. Only the programs with "0" No. are searched.

[Related signals]

(1) Search & start program No. (R2562, R2563)
(2) Search & start error (SSE: XC8A)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CHOPPING PARAMETER VALID		YC34	YD74	YEB4	YFF4	Y1134	Y1274	Y13B4	Y14F4

[Function]

This signal validates the chopping control data assigned to R register.

[Operation]

(1) The chopping control data is validated at the rising edge of this signal.

(2) This signal must be turned OFF after confirming the chopping start ready completion signal is turned ON. Chopping start ready completion signal is included in the control status within the chopping control data.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	INCLINED AXIS CONTROL VALID		YC35	YD75	YEB5	YFF5	Y1135	Y1275	Y13B5	Y14F5

[Function]

This signal validates the inclined axis control.

[Operation]

When this signal is turned ON, the inclined axis control is executed following the set parameter.

If this signal is turned OFF from ON, the inclined axis control will be invalid.

[Caution]

Even if this signal is changed over during the axis movement or the automatic operation, this signal will not be valid.

If this signal is changed over during the axis movement, this signal will be valid after the axis movement is stopped.

If this signal is changed over during the automatic operation, the block stop will occur.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	INCLINED AXIS CONTROL NO Z AXIS COMPENSATION		YC36	YD76	YEB6	YFF6	Y1136	Y1276	Y13B6	Y14F6

[Function]

Select whether the movement for the inclined axis in the manual operation is affected to the corresponding basic axis or not.

[Operation]

When this signal is turned ON and the manual operation for the inclined axis is executed, the corresponding basic axis is not moved.

When this signal is turned OFF and the manual operation for the inclined axis is executed, the compensation operation attending the movement of the inclined axis is executed to the corresponding basic axis.

[Caution]

Even if this signal is changed over during the axis movement, this signal will not be valid.

If this signal is changed over during the axis movement, this signal will be valid after the axis movement is stopped.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	OPTIONAL BLOCK SKIP m	BDT1 to 9	YC37 to F	YD77 to F	YEB7 to F	YFF7 to F	Y1137 to F	Y1277 to F	Y13B7 to F	Y14F7 to F

[Function]

Block accompanying "/n (n: 1 to 9)" (slash) can be skipped.

By creating a machining program with a "/" code inserted, a different part can be machined with one program.

[Operation]

(1) When a program having a block with "/n" (slash code) placed at the head of block is executed with "Optional block skip" signal turned ON, the block is skipped. The block with the "/n" code in the middle instead of at the head will be executed.

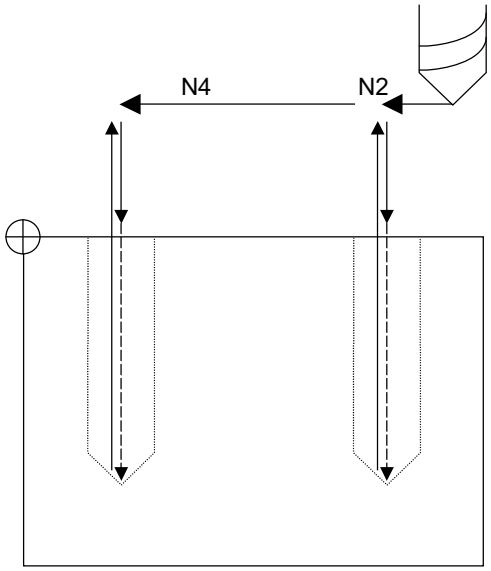
When the signal is OFF, block with "/n" is executed.

(Example) If machining the two parts as illustrated below, create the following program. When machining with the "Optional block skip" signal ON, part 1 will be provided. With the signal OFF, part 2 will be provided.

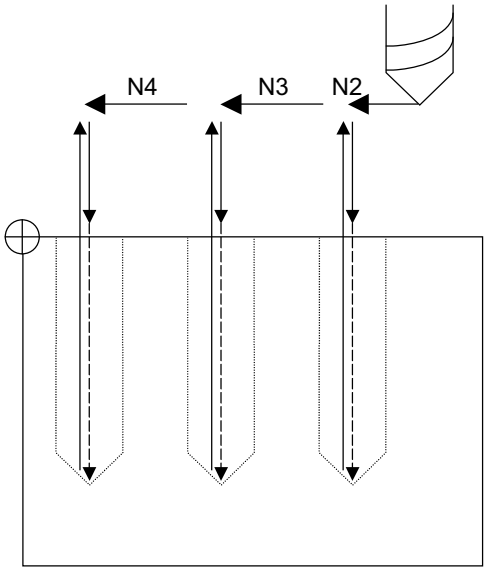
<Program>

```
N1 G54;
N2 G90G81X50. Z-20. R3. F100;
/1N3 X30.;
N4 X10.;
N5 G80;
M02;
```

Part 1
Optional block skip ON



Part 2
Optional block skip OFF



Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	1ST HANDLE AXIS SELECTION CODE m	HS11 to 116	YC40 to 4	YD80 to 4	YEC0 to 4	Y1000 to 4	Y1140 to 4	Y1280 to 4	Y13C0 to 4	Y1500 to 4

[Function]

In HANDLE mode (handwheel is operated), axis component to be moved is selected.

In the case of 2-axis or 3-axis handle specification (two or three handles are required), axis is selected for the 1st handle.

[Operation]

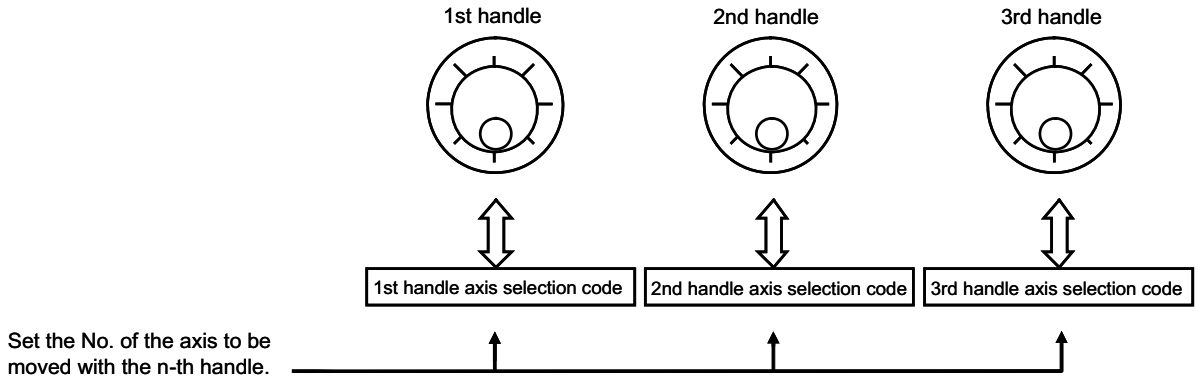
For axis motion in HANDLE mode:

(1) Select HANDLE mode.
(2) Specify axis No. for 1st handle axis selection code
(3) Turn ON "1st handle valid" (HS1S) signal (later described).
(4) Turn the handle (handwheel) ... motion will start.

The relationship between "handle axis No." and "motion axis" is as follows:

Handle axis No. / Motion axis	HS 1S	—	—	HS 116	HS 18	HS 14	HS 12	HS 11
X axis (1st axis) selected	1	—	—	0	0	0	0	1
Y axis (2nd axis) selected	1	—	—	0	0	0	1	0
Z axis (3rd axis) selected	1	—	—	0	0	0	1	1
#4 axis (4th axis) selected	1	—	—	0	0	1	0	0
#5 axis (5th axis) selected	1	—	—	0	0	1	0	1
#6 axis (6th axis) selected	1	—	—	0	0	1	1	0
#7 axis (7th axis) selected	1	—	—	0	0	1	1	1
#8 axis (8th axis) selected	1	—	—	0	1	0	0	0

"1st handle valid" signal


1st handle
2nd handle
3rd handle
1st handle axis selection code
2nd handle axis selection code
3rd handle axis selection code
Set the No. of the axis to be moved with the n-th handle.

[Related signals]

(1) 2nd handle axis selection code m (HS21 to 216: YC48 to YC4C)
(2) 2nd handle valid (HS2S: YC4F)
(3) 3rd handle axis selection code m (HS31 to 316: YC50 to YC54)
(4) 3rd handle valid (HS3S: YC57)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	1ST HANDLE VALID	HS1S	YC47	YD87	YEC7	Y1007	Y1147	Y1287	Y13C7	Y1507

[Function]

In HANDLE mode, axis No. of axis motion component to be moved is set for 1st handle axis selection code (HS11 to HS116). To make valid the specified handle axis No., this signal is used.

[Operation]

Axis motion does not start when the 1st handle (handwheel) is rotated after HANDLE mode is selected and the desired axis No. is set for the 1st handle axis selection code if this signal (HS1S) is not given. Although either the "1st handle axis selection code" signal or the "1st handle valid" signal can be given first, these two signals are to be given when manual axis motion is started.

[Related signals]

(1) 1st handle axis selection code m (HS11 to 116: YC40 to 4)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	2ND HANDLE AXIS SELECTION CODE m	HS21 to 216	YC48 to C	YD88 to C	YEC8 to C	Y1008 to C	Y1148 to C	Y1288 to C	Y13C8 to C	Y1508 to C

[Function]

This signal selects which handle to move with the 2nd handle when using the 2-axis or 3-axis handle specifications (two or three handles are required).

[Operation]

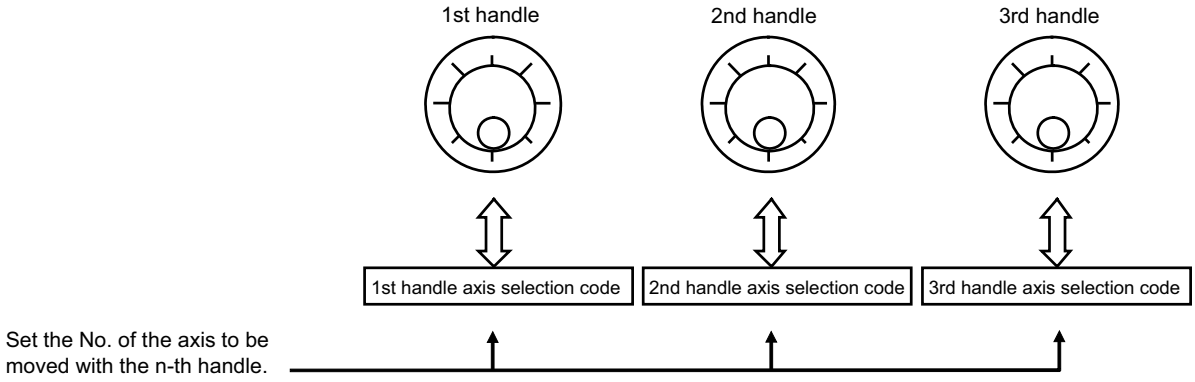
For axis motion controlled by the 2nd handle:

(1) Select HANDLE mode.
(2) Specify axis No. for 2nd handle axis selection code
(3) Turn ON "2nd handle valid" signal (HS2S).
(4) Turn the handle (handwheel) ... motion will start.

The relationship between "handle axis No." and "motion axis" is as follows:

Handle axis No. / Motion axis	HS 2S	—	—	HS 216	HS 28	HS 24	HS 22	HS 21
X axis (1st axis) selected	1	—	—	0	0	0	0	1
Y axis (2nd axis) selected	1	—	—	0	0	0	1	0
Z axis (3rd axis) selected	1	—	—	0	0	0	1	1
#4 axis (4th axis) selected	1	—	—	0	0	1	0	0
#5 axis (5th axis) selected	1	—	—	0	0	1	0	1
#6 axis (6th axis) selected	1	—	—	0	0	1	1	0
#7 axis (7th axis) selected	1	—	—	0	0	1	1	1
#8 axis (8th axis) selected	1	—	—	0	1	0	0	0

"2nd handle valid" signal


1st handle
2nd handle
3rd handle
1st handle axis selection code
2nd handle axis selection code
3rd handle axis selection code
Set the No. of the axis to be moved with the n-th handle.

[Related signals]

(1) 1st handle axis selection code m (HS11 to 116: YC40 to 4)
(2) 1st handle valid (HS1S: YC47)
(3) 3rd handle axis selection code m (HS31 to 316: YC50 to 4)
(4) 3rd handle valid (HS3S: YC57)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	2ND HANDLE VALID	HS2S	YC4F	YD8F	YECF	Y100F	Y114F	Y128F	Y13CF	Y150F

[Function][Operation]

This signal is the same as "1st handle valid" signal in function and operation, except that it is applicable only to 2-axis handle specification (two handles are required).

Refer to the above table for the relation with the "2nd handle axis selection code" (HS21 to 216).

[Related signals]

(1) 2nd handle axis selection code m (HS21 to 216: YC48 to C)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	3RD HANDLE AXIS SELECTION CODE m	HS31 to 316	YC50 to 4	YD90 to 4	YED0 to 4	Y1010 to 4	Y1150 to 4	Y1290 to 4	Y13D0 to 4	Y1510 to 4

[Function]

This signal selects which handle to move with the 3rd handle when using the 3-axis handle specifications (three handle is required).

[Operation]

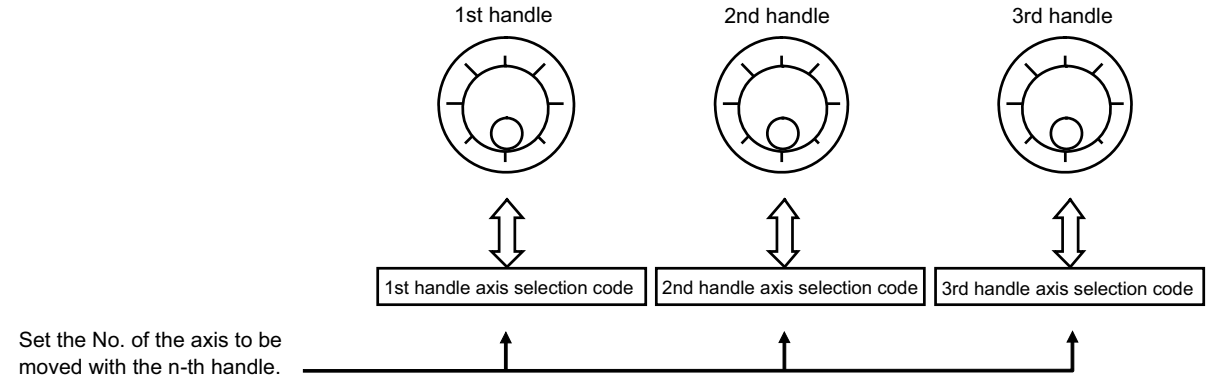
For axis motion in HANDLE mode:

(1) Select HANDLE mode.
(2) Specify axis No. for 3rd handle axis selection code
(3) Turn ON "3rd handle valid" (HS3S) signal (later described).
(4) Turn the handle (handwheel) ... motion will start.

The relationship between "handle axis No." and "motion axis" is as follows:

Handle axis No. / Motion axis	HS 3S	—	—	HS 316	HS 38	HS 34	HS 32	HS 31
X axis (1st axis) selected	1	—	—	0	0	0	0	1
Y axis (2nd axis) selected	1	—	—	0	0	0	1	0
Z axis (3rd axis) selected	1	—	—	0	0	0	1	1
#4 axis (4th axis) selected	1	—	—	0	0	1	0	0
#5 axis (5th axis) selected	1	—	—	0	0	1	0	1
#6 axis (6th axis) selected	1	—	—	0	0	1	1	0
#7 axis (7th axis) selected	1	—	—	0	0	1	1	1
#8 axis (8th axis) selected	1	—	—	0	1	0	0	0

"3rd handle valid" signal


1st handle
2nd handle
3rd handle
1st handle axis selection code
2nd handle axis selection code
3rd handle axis selection code
Set the No. of the axis to be moved with the n-th handle.

[Related signals]

(1) 1st handle axis selection code m (HS11 to 116: YC40 to 4)
(2) 1st handle valid (HS1S: YC47)
(3) 2nd handle axis selection code m (HS21 to 216: YC48 to C)
(4) 2nd handle valid (HS2S: YC4F)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	3RD HANDLE VALID	HS3S	YC57	YD97	YED7	Y1017	Y1157	Y1297	Y13D7	Y1517

[Function][Operation]

This signal is the same as "1st handle valid" signal in function and operation, except that it is applicable only to 3-axis handle specification (three handles are required).

Refer to the above table for the relation with the "3rd handle axis selection code" (HS31 to HS316).

[Related signals]

(1) 3rd handle axis selection code m (HS31 to HS316: YC50 to YC4)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	OVERRIDE CANCEL	OVC	YC58	YD98	YED8	Y1018	Y1158	Y1298	Y13D8	Y1518

[Function]

With this signal, override to cutting feedrate input to the controller during automatic operation is ignored.

[Operation]

When the signal (OVC) turns ON ...

(1) Cutting feedrate override code (*FV1 to 16) is ignored and feedrate specified by F command is selected.

(2) When cutting feedrate override is set at "0%", the signal (OVC) is not valid (feedrate is zero and no motion occurs).

(3) The signal does not affect to "Manual feedrate override" and "Rapid traverse override".

[Related signals]

(1) Cutting feedrate override code m (*FV1 to 16: YC60)

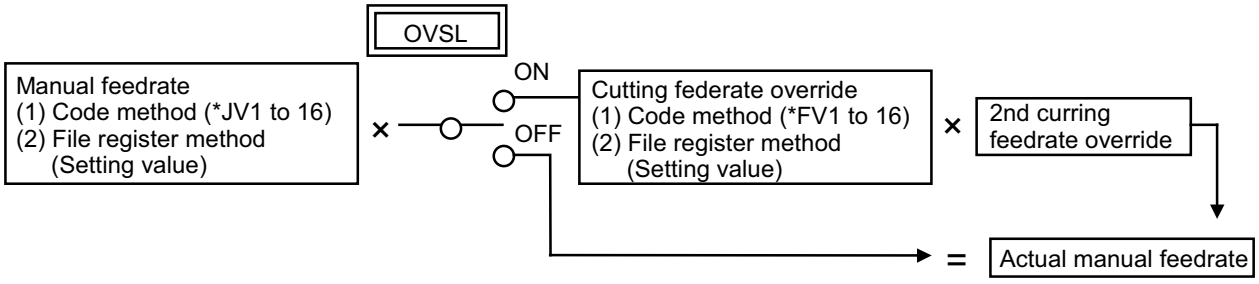
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL OVERRIDE METHOD SELECTION	OVSL	YC59	YD99	YED9	Y1019	Y1159	Y1299	Y13D9	Y1519

[Function]

Override can be exerted on "manual feedrate" (feedrate in JOG feed, incremental feed, etc. during manual operation).

[Operation]

When this signal (OVSL) is turned ON when manual feedrate has been set, the previously set cutting feedrate override (%) is applied to that feedrate.



(Note) For details of "manual feedrate", "cutting feedrate override" and "2nd cutting feedrate override", refer to the relevant descriptions.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MISCELLANEOUS FUNCTION LOCK	AFL	YC5A	YD9A	YEDA	Y101A	Y115A	Y129A	Y13DA	Y151A

[Function]

Strobe signal for miscellaneous function (M, S, T and B) specified during automatic operation cannot be output when this signal is used. The signal (AFL) can be used to check machining program, for example.

[Operation]

When the signal (AFL) turns ON:

(1) Miscellaneous function (M, S, T and B) specified in automatic operation cannot be executed, i.e. output of code data and function strobe signal (MF1 to 4, SF1 to 4, TF1 to 4, BF1 to 4) are withheld.

(2) If the signal turns ON after code data is output, that output is accepted and the corresponding function can be completed (FIN1 or FIN2 is received and strobe signal is set to "0").

(3) Miscellaneous function M00, M01, M02 or M30 is, however, accepted and realized even when the signal (AFL) is ON and the decode signals, code data and "M function strobe" signal are output.

(4) Miscellaneous function which is executed within the controller and does not output its code data and "M function strobe" signal, such as M98 and M99, is executed even when the signal is ON.

(Note) As for S command data (output), the value before "Miscellaneous function lock" signal (AFL) is turned ON will be retained even when this signal is ON. When the signal is ON at NC power ON, S command data will be 0V.

[Related signals]

(1) M function strobe (MFn: XC60)
(2) M code data (R504)
(3) S function strobe (SFn: XC64)
(4) S code data (R512)
(5) T function strobe 1 (TF1: XC68)
(6) T code data (R536)
(7) 2nd M function strobe 1 (BF1: XC6C)
(8) 2nd M function data (R544)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TAP RETRACT	TRV	YC5C	YD9C	YEDC	Y101C	Y115C	Y129C	Y13DC	Y151C

[Function]

This function is used to remove the tap from the workpiece when tap cycle has been stopped due to emergency stop, etc.

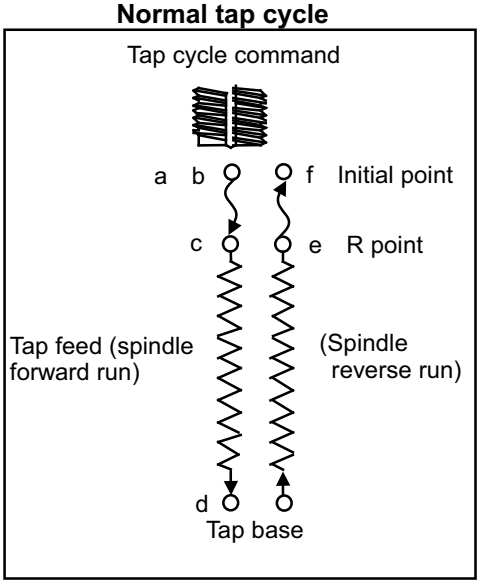
[Operation]

If the "Tap retract" signal (TRV) is turned ON while the "Tap retract possible" signal (TRVE) is ON due to an interruption in the tap cycle, the tap retract operation can be started.

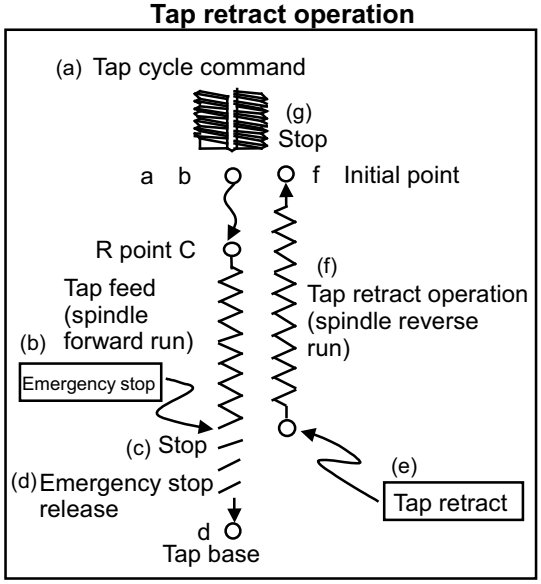
(1) The following items are conditions for tap retract. (The "Tap retract possible" signal will turn ON at this time.)
- Emergency stop during tap cycle
- Reset during tap cycle
- Power OFF during tap cycle (Only for absolute position detection system)

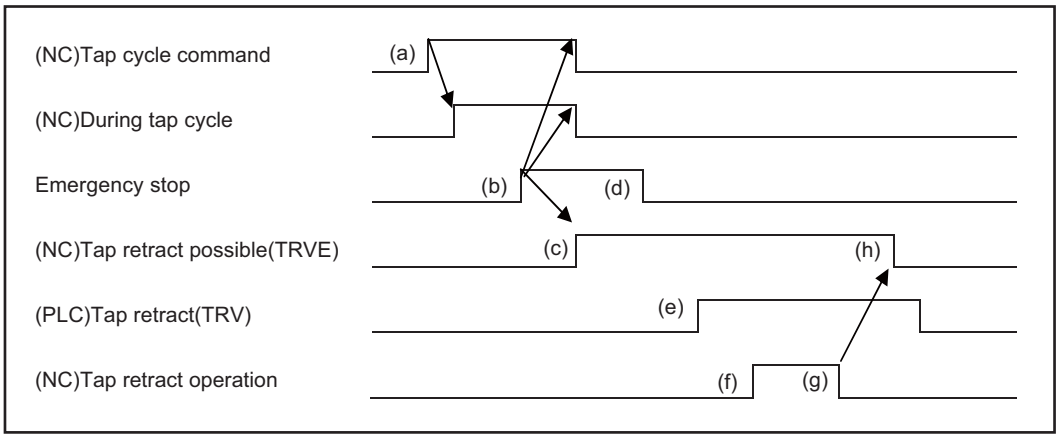
(2) Tap retract is executed as follows:
- Execute the synchronous tap cycle command.→(a)
- Stop the tap cycle with emergency stop.→(b)
- The "Tap retract possible" signal (TRVE) turns ON. →(c)
- Release the emergency stop. (The "Servo ready completion" signal (SA) turns ON.)→(d)
- Turn ON the "Tap retract" signal (TRV).→(e)
- The spindle will rotate in reverse, and the tap axis will move toward the tap cycle's initial point.The feedrate is the tap cycle feedrate. →(f)
- When the tap axis reaches the tap cycle initial point, the spindle and tap axis will stop, and tap retract will be completed.→(g)
- The "Tap retract possible" signal (TRVE) will turn OFF.

Normal tap cycle



Tap retract operation





Tap retract operation

(Note 1) The area between "c" and "e" in the figure above is the tap cycle. The "Tap retract possible" signal will not be output if the operation is not stopped in this area.
(Note 2) This signal is valid only during rising edge of the signal.
(Note 3) When this signal turns ON, emergency stop and reset will not function.
(Note 4) When the parameter "#1234 set06/bit3" is set to "0", the tap retract operation is not carried out even this signal is turned ON during the operation error "0057".

[Related signals]

(1) Tap retract possible (TRVE: XCA5)
(2) Tap retract possible state cancel (TRVEC:YCD6)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL HANDLE FEED MODE		YC5E	YD9E	YEDE	Y101E	Y115E	Y129E	Y13DE	Y151E

[Function]

When this signal is turned ON, tool handle feed mode will be activated.
In the tool handle feed mode, axis can be moved with the manual pulse generator in tool axis direction, tool radius direction X and Y within the hypothetical coordinate system over the tool axis.

[Operation]

When the tool handle feed mode is selected, axis moves with the manual pulse generator in tool axis direction, tool radius direction X and Y.
Operate in the following procedure.

(1) Select handle mode at the mode selection
(2) Turn ON the signal (YC5E)
(3) Move in tool axis direction, tool radius direction X and Y.

Handle feed magnification is shown as below.

Handle feed magnification	YC82	YC81	YC80
1-fold	0/1	0	0
10-fold	0/1	0	1
100-fold	0/1	1	0
1000-fold	0/1	1	1

(Note1) When the signal (YC5E) is "0", it is considered as normal handle mode.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
B	CUTTING FEEDRATE OVERRIDE CODE m	*FV1 to 16	YC60 to 4	YDA0 to 4	YEE0 to 4	Y1020 to 4	Y1160 to 4	Y12A0 to 4	Y13E0 to 4	Y1520 to 4

[Function]

Override (multiplication) can be exerted to cutting feedrate (F feedrate) during automatic operation with this signal.

[Operation]

When the signal is valid, true feedrate is the product obtained by multiplying referenced speed by override ratio (%) specified by the signal.

Override is 100%, even when the signal is given, in the following cases:

(1) When "Override cancel" (OVC) signal is ON.
(2) During tapping mode.
(3) During thread cutting.

These signals (*FV1 to 16) are set with the code method. The relation is shown below.

*FV16	*FV8	*FV4	*FV2	*FV1	Cutting feedrate override	
1	1	1	1	1	0%	
1	1	1	1	0	10%	
1	1	1	0	1	20%	
1	1	1	0	0	30%	
1	1	0	1	1	40%	
1	1	0	1	0	50%	
1	1	0	0	1	60%	
1	1	0	0	0	70%	
1	0	1	1	1	80%	
1	0	1	1	0	90%	Generally, the rotary switch (5-step, 21-notch, compliment binary code output) is connected to the operation board, and used between 0 and 200%.
1	0	1	0	1	100%	
1	0	1	0	0	110%	
1	0	0	1	1	120%	
1	0	0	1	0	130%	
1	0	0	0	1	140%	
1	0	0	0	0	150%	
0	1	1	1	1	160%	
0	1	1	1	0	170%	
0	1	1	0	1	180%	If *FV1 to *FV16 are all OFF, the previous value will be maintained. The value will change to 0% when the power is turned OFF.
0	1	1	0	0	190%	
0	1	0	1	1	200%	
0	1	0	1	0	210%	
0	1	0	0	1	220%	
0	1	0	0	0	230%	
0	0	1	1	1	240%	
0	0	1	1	0	250%	
0	0	1	0	1	260%	
0	0	1	0	0	270%	
0	0	0	1	1	280%	
0	0	0	1	0	290%	
0	0	0	0	1	300%	

[Related signals]

(1) Override cancel (OVC: YC58)
(2) 2nd cutting feedrate override valid (FV2E: YC66)
(3) Cutting feedrate override method selection (FVS: YC67)

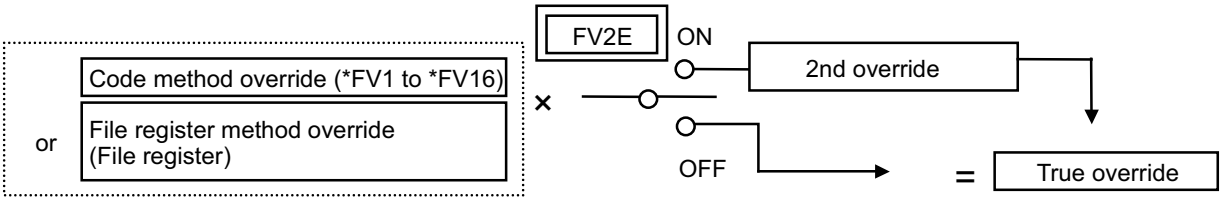
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	2ND CUTTING FEEDRATE OVERRIDE VALID	FV2E	YC66	YDA6	YEE6	Y1026	Y1166	Y12A6	Y13E6	Y1526

[Function]

Override normally exerted on cutting feedrate in automatic operation is within a range from 0% to 300%. When this signal is used, another override (ranging from 0% to 327.67%) can be exerted on overridden feedrate.

[Operation]

When the signal (FV2E) is ON, override can be exerted on feedrate previously overridden in code method (*FV1 to 16), or file register method (by setting numerals manually). Applicable range of the 2nd override is 0% to 327.6% (0.01% increment). Value (override ratio) is set to file register in binary code.



Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CUTTING FEEDRATE OVERRIDE METHOD SELECTION	FVS	YC67	YDA7	YEE7	Y1027	Y1167	Y12A7	Y13E7	Y1527

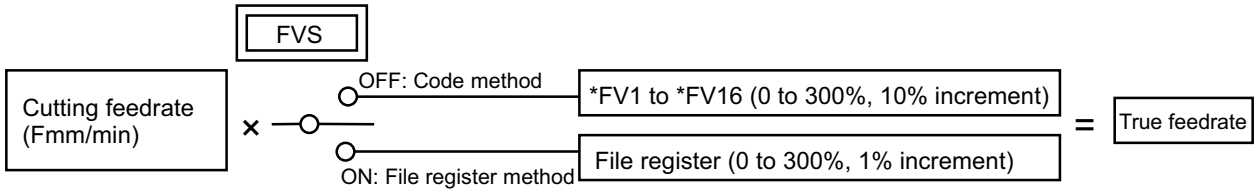
[Function]

When override is exerted on cutting feedrate in automatic operation, override method can be selected between "code method" and "file register method".

[Operation]

When the signal (FVS) is OFF, code method (*FV1 to 16) is selected.

When the signal (FVS) is ON, file register method (value is specified by manual setting) is selected.



(Note) For details of code method and file register method, refer to the relevant descriptions.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	RAPID TRAVERSE OVERRIDE CODE 1,2	ROV1,2	YC68,9	YDA8,9	YEE8,9	Y1028,9	Y1168,9	Y12A8,9	Y13E8,9	Y1528,9

[Function]

This signal is used to exert override on rapid traverse speed set by parameter (for rapid traverse) in automatic operation (memory, MDI or tape) or manual operation.

[Operation]

The true rapid traverse speed is that obtained by multiplying rapid traverse speed (set by parameter) by override ratio specified by this signal.

This signal is invalid if the "Rapid traverse" signal (RT) is OFF during cutting feed during automatic operation or during manual operation.

These signals (ROV1, 2) are set with the code method. The relation is shown below.

ROV2	ROV1	Rapid traverse override
0	0	100%
0	1	50%
1	0	25%
1	1	1%

[Related signals]

(1) Rapid traverse override method selection (ROVS: YC6F)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	RAPID TRAVERSE OVERRIDE METHOD SELECTION	ROVS	YC6F	YDAF	YEEF	Y102F	Y116F	Y12AF	Y13EF	Y152F

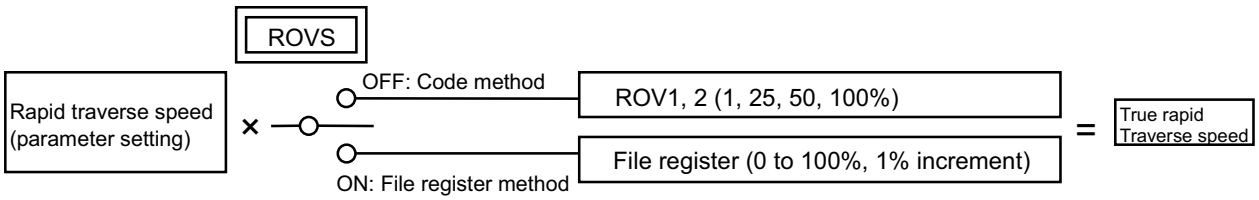
[Function]

When speed override is exerted on rapid traverse speed specified in automatic operation or manual operation, override method is selected between code method and file register method (manually set).

[Operation]

When the signal (ROVS) is OFF, code method (ROV1, 2) is used.

When the signal (ROVS) is ON, file register method is used.



(Note) For details of "code method override" and "file register method", refer to the respective description.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
B	MANUAL FEEDRATE CODE m	*JV1 to 16	YC70 to 4	YDB0 to 4	YEF0 to 4	Y1030 to 4	Y1170 to 4	Y12B0 to 4	Y13F0 to 4	Y1530 to 4

[Function]

Feedrate in manual operation (JOG mode, incremental feed mode, etc.) or in dry run of automatic operation (memory, MDI, tape) is selected.

[Operation]

This signal is valid in the following cases, but will be invalid when the "Rapid traverse" signal (RT) is ON.

(1) Jog mode, incremental mode or reference position return mode is ON.

(2) During cutting feed in automatic operation and "Dry run" signal (DRN) is ON.

(3) Dry run signal is ON during rapid traverse in the automatic operation. Note that parameter "#1085 G00 dry run" must be ON.

These signals (*JV1 to 16) are set with the code method. The relation is shown below.

*JV16	*JV8	*JV4	*JV2	*JV1	Manual feedrate			
					Machine parameter set in meters		Machine parameter set in inches	
					Metric mode (mm/min)	Inch mode (inch/min)	Metric mode (mm/min)	Inch mode (inch/min)
1	1	1	1	1	0.00	0.000	0.00	0.000
1	1	1	1	0	1.00	0.040	0.51	0.020
1	1	1	0	1	1.40	0.054	0.71	0.028
1	1	1	0	0	2.00	0.079	1.02	0.040
1	1	0	1	1	2.70	0.106	1.37	0.054
1	1	0	1	0	3.70	0.146	1.88	0.074
1	1	0	0	1	5.20	0.205	2.64	0.104
1	1	0	0	0	7.20	0.283	3.66	0.144
1	0	1	1	1	10.00	0.394	5.08	0.200
1	0	1	1	0	14.00	0.551	7.11	0.280
1	0	1	0	1	20.00	0.787	10.16	0.400
1	0	1	0	0	27.00	1.060	13.72	0.540
1	0	0	1	1	37.00	1.460	18.80	0.740
1	0	0	1	0	52.00	2.050	26.42	1.040
1	0	0	0	1	72.00	2.830	36.58	1.440
1	0	0	0	0	100.00	3.940	50.80	2.000
0	1	1	1	1	140.00	5.510	71.12	2.800
0	1	1	1	0	200.00	7.870	101.60	4.000
0	1	1	0	1	270.00	10.600	137.16	5.400
0	1	1	0	0	370.00	14.600	187.96	7.400
0	1	0	1	1	520.00	20.500	264.16	10.400
0	1	0	1	0	720.00	28.300	365.76	14.400
0	1	0	0	1	1000.00	39.400	508.00	20.000
0	1	0	0	0	1400.00	55.100	711.20	28.000
0	0	1	1	1	2000.00	78.700	990.60	39.000
0	0	1	1	0	2700.00	106.000	1371.60	54.000
0	0	1	0	1	3700.00	146.000	1879.60	74.000
0	0	1	0	0	5200.00	205.000	2641.60	104.000
0	0	0	1	1	7200.00	283.000	3657.60	144.000
0	0	0	1	0	10000.00	394.000	5080.00	200.000
0	0	0	0	1	14000.00	551.000	7112.00	280.000

*JV 1 to *JV16 are all OFF, the previous value will be maintained. The value will be set to 0 when the power is turned OFF.

(Note 1) In JOG mode, true feedrate changes if this signal changes during feed motion.

(Note 2) In incremental feed mode, true feedrate does not change if this signal changes during feed motion.

[Related signals]

(1) Manual feedrate method selection (JVS:YC77)

(2) Manual override method selection (OVSL:YC59)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL SPEED CLAMP ON	MCLMP	YC76	YDB6	YEF6	Y1036	Y1176	Y12B6	Y13F6	Y1536

[Function]

This signal selects the maximum speed for handle feed or jog feed during manual operation.

[Operation]

When "#1469 m_clamp_enable" (Manual speed clamp ON) is set to "0: Invalid"

ON: The speed designated with "#2641 m_clamp" (Manual feed clamp speed) is used as the maximum speed.

OFF: The speed designated with "#2001 rapid" (Rapid traverse speed) is used as the maximum speed.

When "#1469 m_clamp_enable" (Manual speed clamp ON) is set to "1: Valid"

The speed designated with "#2641 m_clamp" (Manual feed clamp speed) is used as the maximum speed regardless of the state of this signal.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL FEEDRATE METHOD SELECTION	JVS	YC77	YDB7	YEF7	Y1037	Y1177	Y12B7	Y13F7	Y1537

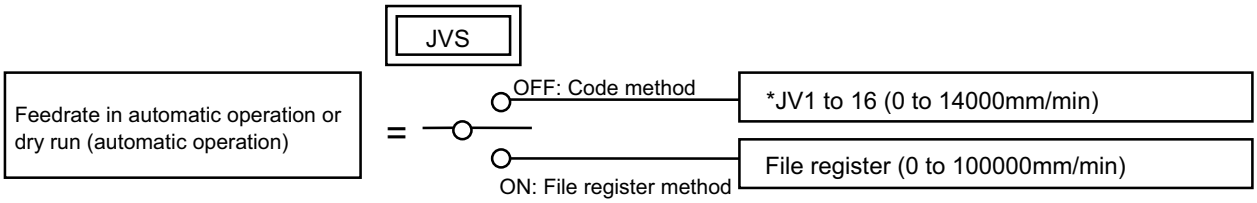
[Function]

When feedrate is specified in manual operation (JOG mode, incremental feed mode, etc.) or dry run (automatic operation), feedrate command method is selected between code method and file register method.

[Operation]

When the signal (JVS) is OFF, code method (*JV1 to *JV16) is selected.

When the signal (JVS) is ON, file register method is selected.


JVS
Feedrate in automatic operation or dry run (automatic operation)
=
OFF: Code method
*JV1 to 16 (0 to 14000mm/min)
File register (0 to 100000mm/min)
ON: File register method

(Note 1) For details of "code method feedrate" and "file register method feedrate", refer to the relevant description.

(Note 2) If "#2642 jogfeed (jog feedrate)" is nonzero, the setting value is treated as the feedrate of the axis.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	FEEDRATE LEAST INCREMENT CODE 1,2	PCF1,2	YC78,9	YDB8,9	YEF8,9	Y1038,9	Y1178,9	Y12B8,9	Y13F8,9	Y1538,9

[Function]

When manual feedrate is specified in file register method (JVS: "ON") or in arbitrary manual feed mode, file registers R (R2504 and R2505) are used. In this case, least increment of feedrate entered into file registers R2504 and R2505 is specified by this signal.

[Operation]

The relationship between PCF1/PCF2 and least feed increment is as follows:

PCF2	PCF1	Least increment (mm/min or inch/min)	Operation
0	0	10	10mm/min (inch/min) when "1" is set in file registers.
0	1	1	1mm/min (inch/min) when "1" is set in file registers.
1	0	0.1	0.1mm/min (inch/min) when "1" is set in file registers.
1	1	0.01	0.01mm/min (inch/min) when "1" is set in file registers.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	JOG HANDLE SYNCHRONOUS	JHAN	YC7B	YDBB	YEFB	Y103B	Y117B	Y12BB	Y13FB	Y153B

[Function]

Jog feed and handle feed can be carried out without changing the operation mode.

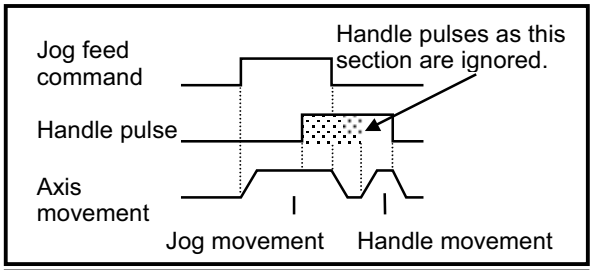
[Operation]

If the "Jog mode" (J) signal and this signal are input simultaneously, the "jog/handle synchronous mode" will be entered. If the "Rapid traverse" (RT) signal is turned ON during the "jog/handle synchronous mode", the jog feed will be carried out at the rapid traverse feedrate. When the "Rapid traverse" turns OFF, the jog feed will be carried out at the manual feedrate.

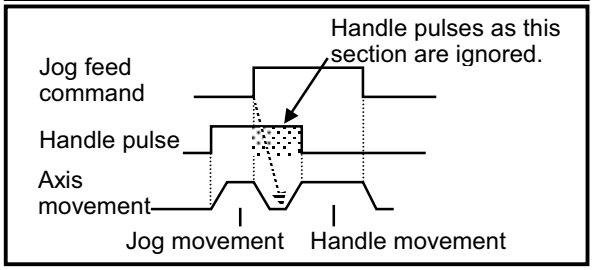
Operation mode	Jog handle synchronous signal (YC7B)	Rapid traverse signal (YC26)	Operation during jog feed	Handle feed
Jog feed	On	On	Rapid traverse feedrate	Possible
		Off	Manual feedrate	Possible
	Off	On	Rapid traverse feedrate	Impossible
		Off	Manual feedrate	Impossible

(1) During "jog/handle synchronous mode", jog feed and handle feed can be carried out randomly. However, jog feed and handle feed cannot be carried out simultaneously on the same axis. If carried out simultaneously, the jog feed will have a priority. The changeover between jog feed and handle feed on the same axis is carried out when the relevant axis has stopped.

- If handle feed is carried out on an axis that is being jog fed, the jog feed will have a priority, so after movement with jog feed has completed (the axis has stopped), handle feed movement will start.



- If jog feed is carried out on an axis that is being handle fed, the handle feed movement will stop at the rising edge of the jog feed command. After the axis stops, the jog feed movement will start.



(Note) If only the "Jog handle synchronous" signal is output, "M01 OPERATION ERROR 0101" will occur. If the "Jog handle synchronous" signal is input simultaneously with an operation mode signal other than the jog mode, the "Jog handle synchronous" signal will be ignored.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	EACH AXIS MANUAL FEEDRATE B VALID		YC7C	YDBC	YEFC	Y103C	Y117C	Y12BC	Y13FC	Y153C

[Function]

This signal validates manual feed using each axis manual feedrate B.

[Operation]

(1) If this signal and the manual feedrate B valid signal for the corresponding axis are validated when carrying out manual feed in the jog mode, the axis will move at the speed commanded by each axis manual feedrate B which is commanded separately from the manual feedrate or manual feedrate B.

(2) This signal is common for all axes.

[Related signals]

(1) Manual feedrate B valid (FBEn: Y940 to Y947)

(2) Each axis manual feedrate B (R5764 to R5779)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL FEEDRATE B SURFACE SPEED CONTROL VALID		YC7D	YDBD	YEFD	Y103D	Y117D	Y12BD	Y13FD	Y153D

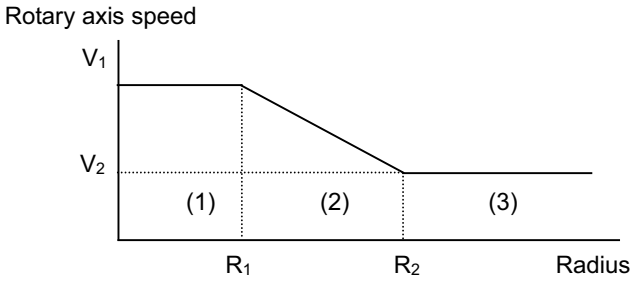
[Function]

This signal validates manual federate B surface speed control.

[Operation]

It validates the manual feedrate B surface speed control for a rotary axis selected by the manual feedrate B valid signal. If "0" is set, it will be invalid.
This signal is common for all axes.

When machining by moving the orthogonal axis while rotating the rotary table with the manual feedrate B surface speed control function, the tool nose and workpiece's relative speed will drop as the tool nears the rotation center if the table rotation speed remains under the set conditions.
The table rotation speed can be controlled according to the distance from the rotation center by validating the manual feedrate B surface speed control.
As shown below, the distances (radiuses) from the rotation center to two points (R1 and R2) and the rotary axis speed at the two points (R1 and R2) are set as parameters. When the "manual feedrate B surface speed control valid" signal (YC7D) is turned ON, the rotary axis speed is calculated automatically in accordance with a current radius.



(1) If R ≦ R1, then V1will be applied.
(2) If R<R2, the speed V is calculated with the following expression.

$$V=\frac{(V_2 - V_1)}{(R_2 - R_1)} *(R - R_1)+V_1$$

(3) If R2≤R, then V2 will be applied.

Override can be applied in the range of 0 to 200% in respect to the rotary axis speed.

[Caution]

(1) For a linear axis, the manual feedrate B surface speed control is not valid; however, the manual feedrate B override is valid.
(2) When the power is turned ON, validate the manual feedrate B surface speed control after returning the orthogonal axis to the reference position, establishing the coordinate system. If the surface speed control is applied to the rotary axis without establishing the coordinate system, the rotary axis moves at unexpected speed.

[Related signals]

(1) Manual feedrate B valid (FBEn: Y940 to Y947)
(2) Manual feedrate B override (R2524)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CIRCULAR FEED IN MANUAL MODE VALID		YC7E	YDBE	YEFE	Y103E	Y117E	Y12BE	Y13FE	Y153E

[Function]

This signal is used to execute JOG or handle feed for the X and Y axes on the specified coordinate ("linear-linear" or "circular-linear").

[Operation]

After this signal turns ON in the JOG or handle mode, the X and Y axes move on the specified hypothetical coordinate. (The coordinate and so on are specified with the R registers explained below.)

[Caution]

(1) This signal does not effect on the operation of the axes other than X and Y axes, nor the PLC axis.
(2) This signal does not turn ON in the following conditions.
  (a) Either X axis or Y axis is in machine lock.
    (In this case, even machine lock is not performed.)
  (b) Either X axis or Y axis is not completed the reference position return.
  (c) Either X axis or Y axis is in servo OFF.
  (d) When the NC is in one of the following states.
    - Automatic operation (OP)
    - Emergency stop
    - Reset
  (e) The current position is outside of the specified movable range.
  (f) The setting value which is specified with R register is illegal.

[Related signals]

(1) In circular feed in manual mode (XC4F)
(2) Circular feed in manual mode operation mode data (R2636,7)
(3) Circular feed in manual mode basic point X data (R2644,5)
(4) Circular feed in manual mode basic point Y data (R2648,9)
(5) Circular feed in manual mode gradient/arc center X data (R2668,9)
(6) Circular feed in manual mode gradient/arc center Y data (R2672,3)
(7) Circular feed in manual mode travel range X+ data (R2652,3)
(8) Circular feed in manual mode travel range X- data (R2656,7)
(9) Circular feed in manual mode travel range Y+ data (R2660,1)
(10) Circular feed in manual mode travel range Y- data (R2664,5)
(11) Circular feed in manual mode current position X (R636,7)
(12) Circular feed in manual mode current position Y (R640,1)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	HANDLE/INCREMENTAL FEED MAGNIFICATION CODE m	MP1 to 4	YC80 to 2	YDC0 to 2	YF00 to 2	Y1040 to 2	Y1180 to 2	Y12C0 to 2	Y1400 to 2	Y1540 to 2

[Function]

This signal is used to specify the magnification factor per pulse at the handle in HANDLE feed mode, or the amount of feed motion per shot in incremental feed mode (±J1 to 8: "ON").

When the "handle/incremental feed magnification method selection" signal (MPS) is OFF, this magnification is applied for the hand pulse from handy terminal.

[Operation]

This signal (MP1 to 4) is set with the code method.

The amount of feed motion (per pulse feed in handle feed mode, and per ON/OFF of ±Jn value in incremental feed mode) is obtained by multiplying the original feed amount by MP1, MP2, MP4.

When parameter "#1003 iunit" is either "B" or "C", only a value 1000 or smaller can be set regardless of MP4's ON/OFF status.

The relationship between multiplier code (MP1 to 4) and multiplication in each feed mode is as follows.

MP4	MP2	MP1	Amount of motion per handle/ incremental feed	
			#1003 iunit: Other than B or C	#1003 iunit: B,C
0	0	0	1	1
0	0	1	10	10
0	1	0	100	100
0	1	1	1000	1000
1	0	0	1	5000
1	0	1	10	10000
1	1	0	100	50000
1	1	1	1000	100000

[Related signals]

(1) Handle mode (H: YC01)

(2) Incremental mode (S: YC02)

(3) Handle/incremental feed magnification method selection (MPS: YC87)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MAGNIFICATION VALID FOR EACH HANDLE	MPP	YC86	YDC6	YF06	Y1046	Y1186	Y12C6	Y1406	Y1546

[Function] [Operation]

This signal sets magnification per each handle when setting magnification of feed arbitrarily.

(1) When the signal is ON

When setting magnification of feed with an arbitrary value, magnification can be set per each handle.

When selecting magnification with code method, a common magnification of feed will be applied for all handles.

Handle	Magnification of feed	
	File register method	Code method
1st handle	R2508,2509	YC80 to YC82
2nd handle	R2510,2511	
3rd handle	R2512,2513	

(2) When the signal is OFF

When setting magnification of feed with an arbitrary value, magnification of 1st handle/incremental feed (R2508,9) will be applied for all handles.

When selecting magnification with code method, a common magnification of feed will be applied for all handles.

[Related signals]

(1) Handle/incremental feed magnification method selection (MPS: YC87)

(2) Handle/incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)

(3) 1st handle/incremental feed magnification (R2508, R2509)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	HANDLE/INCREMENTAL FEED MAGNIFICATION METHOD SELECTION	MPS	YC87	YDC7	YF07	Y1047	Y1187	Y12C7	Y1407	Y1547

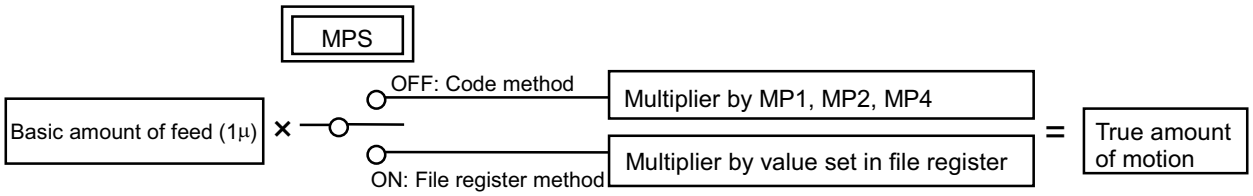
[Function]

Feed magnification method in handle feed or incremental feed is selected between "code method" and "file register method" by this signal.

[Operation]

When the signal (MPS) is OFF, "code feed magnification method" is selected.

When the signal (MPS) is ON, "file register magnification method" is selected.



(Note)For details of the motion corresponding to the code method or file register method, refer to the relevant descriptions.

[Related signals]

(1) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)

(2) 1st Handle/Incremental feed magnification (R2508, R2509)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL ALARM 1	TAL1	YC88	YDC8	YF08	Y1048	Y1188	Y12C8	Y1408	Y1548

[Function]

This signal sets the spindle tool status during tool life management to status 3 (Tool alarm 1/Tool skip).

[Operation]

By turning ON the signal in the tool life management specification, the tool status of a spindle tool or a tool selected when a tool group No. is designated can be changed to "3".

This signal is validated when tool life management input signal (YC8B) is ON.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL ALARM 2	TAL2	YC89	YDC9	YF09	Y1049	Y1189	Y12C9	Y1409	Y1549

[Function]

This signal sets the tool data status during tool life management to status 4 (Tool alarm 2).

[Operation]

By turning ON the signal in the tool life management specification, the tool status of a spindle tool or a tool selected when a tool group No. is designated can be changed to "4".

This signal is validated when tool life management input signal (YC8B) is ON.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	USAGE DATA COUNT VALID	TCEF	YC8A	YDCA	YF0A	Y104A	Y118A	Y12CA	Y140A	Y154A

[Function]

This signal validates tool life count during the tool life management.

[Operation]

The tool life count (usage time or usage count corresponding to tool) is validated in the tool life management specification.

This signal is validated when tool life management input signal (YC8B) is ON.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LIFE MANAGEMENT INPUT	TLF1	YC8B	YDCB	YF0B	Y104B	Y118B	Y12CB	Y140B	Y154B

[Function]

This signal validates the tool life management.

[Operation]

By turning ON the signal in the tool life management specification, the tool life management process is executed.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL CHANGE RESET	TRST	YC8C	YDCC	YF0C	Y104C	Y118C	Y12CC	Y140C	Y154C

[Function]

This signal is used to turn all the tools of a group into an unused state in the tool life management II.

[Operation]

Select with the tool group No. designation (file register R2590, 2591) whether all groups that have exceeded their lifetimes or specific group to turn the tool into an unused state.

After this signal is input, the first tool of the group will be selected at the next group selection.

(Note) When the tool change reset or the tool skip is performed on the group currently selected, usage data count will be carried out on the tool used at the time of signal input until the next tool selection. Therefore, if a tool selected needs to be changed along with the signal input, select a group again. However, a tool may not be selected due to a preceding process if there is no movement command up to the next group selection after the signal input. In this case, contents of the preceding process can be invalidated by turning ON the "recalculation request" (CRQ) signal before selecting the group.

[Related signals]

(1) Recalculation request (CRQ: YC2B)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL ESCAPE AND RETURN TRANSIT POINT DESIGNATION		YC8D	YDCD	YF0D	Y104D	Y118D	Y12CD	Y140D	Y154D

[Function]

With the tool escape and return function, a transit point can be designated by pressing the transit point switch when tool escapes. The tool returns to the machining halted point, passing through the transit point designated.

This signal turns ON when the transit point switch is pressed and turns OFF when recognition of the transit point is completed.

[Operation]

Refer to the section on "In tool escape and return mode signal" (XC4A).

[Related signals]

(1) In tool escape and return mode (XC4A)

(2) Tool escape and return transit point recognition finish (XC87)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	REFERENCE POSITION SELECTION CODE 1,2	ZSL1,2	YC90,1	YDD0,1	YF10,1	Y1050,1	Y1190,1	Y12D0,1	Y1410,1	Y1550,1

[Function]

It is also possible to return to the nth reference position in the manual reference position return mode. This signal is used to select the number of the reference position (n) to return to. Normally both the "Reference position selection code 1, 2" (ZSL1n, ZSL2n) signals are turned OFF, and 1st point reference position return is performed.

[Operation]

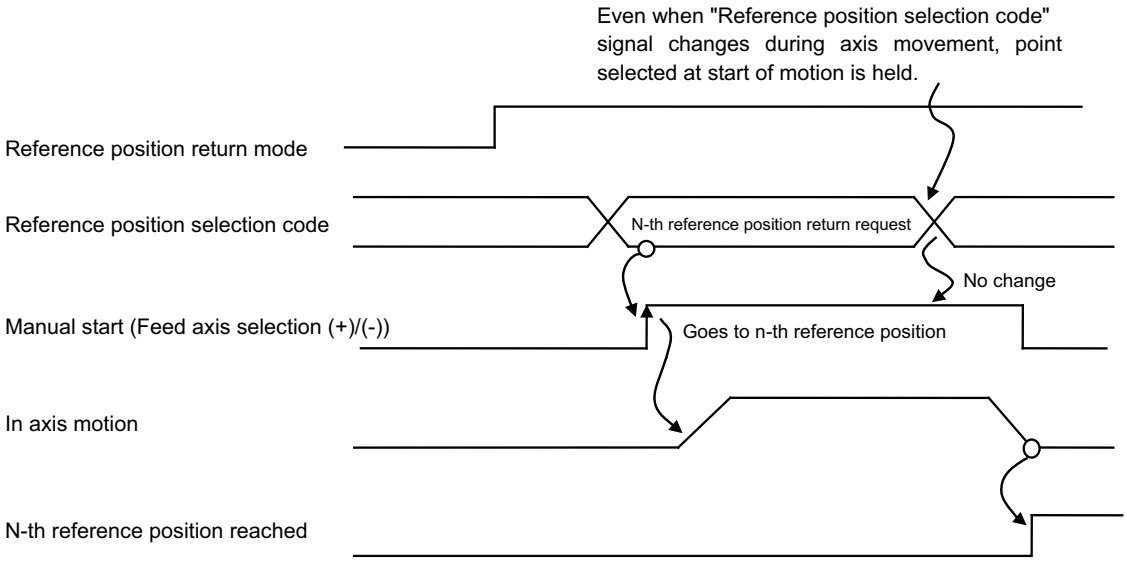
"Reference position selection code 1, 2" (ZSL1n, ZSL2n) signals are valid when:

(1) Reference position return mode is ON ("1").

(2) Manual start condition is held.

Reference position selection code 2	Reference position selection code 1	Return position
0	0	1st reference position
0	1	2nd reference position
1	0	3rd reference position
1	1	4th reference position

(Note 1) Returning to the first reference position must be performed before returning to the second, third or forth reference position.


Even when "Reference position selection code" signal changes during axis movement, point selected at start of motion is held.
Reference position return mode
Reference position selection code
N-th reference position return request
No change
Manual start (Feed axis selection (+)/(-))
Goes to n-th reference position
In axis motion
N-th reference position reached

[Related signals]

(1) Reference position return mode (ZRN: YC04)

(2) Feed axis selection (+Jn: Y1D8, -Jn: Y900)

(3) N-th reference position reached (ZP11 to 48: X800 to X867)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LENGTH COMPENSATION ALONG THE TOOL AXIS COMPENSATION AMOUNT CHANGE MODE		YC92	YDD2	YF12	Y1052	Y1192	Y12D2	Y1412	Y1552

[Function]

This signal controls the tool length compensation along the tool axis compensation amount change mode.

[Operation]

(1) When the signal is ON:
When the handle is operated, only compensation amount of tool length compensation along the tool axis will be changed. Handle interrupt function will be invalid.

(2) When the signal is OFF:
Compensation amount of tool length compensation along the tool axis cannot be changed by the manual handle even during the tool length compensation along the tool axis mode.

[Related signals]

(1) Mechanical axis specifications 1st rotary axis angle / 2nd rotary axis angle (R2628,R2629 / R2630,R2631)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	REFERENCE POSITION SELECTION METHOD	M	YC97	YDD7	YF17	Y1057	Y1197	Y12D7	Y1417	Y1557

[Function]

This signal selects whether the reference position selection is common for all axes or independent for each axis.

[Operation]

When this signal is OFF, the reference position selection is common for all axes, and ZSL1 and ZSL2 are valid.
When this signal is ON, the reference position selection is independent for each axis, and "Each axis reference position selection" is valid.

[Related signals]

(1) Reference position selection code 1,2 (ZSL1, 2: YC90, YC91)
(2) Each axis reference position selection (R2584)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LIFE MANAGEMENT: TEMPORARY CANCEL OF TOOL LIFE EXPIRATION		YC98	YDD8	YF18	Y1058	Y1198	Y12D8	Y1418	Y1558

[Function]

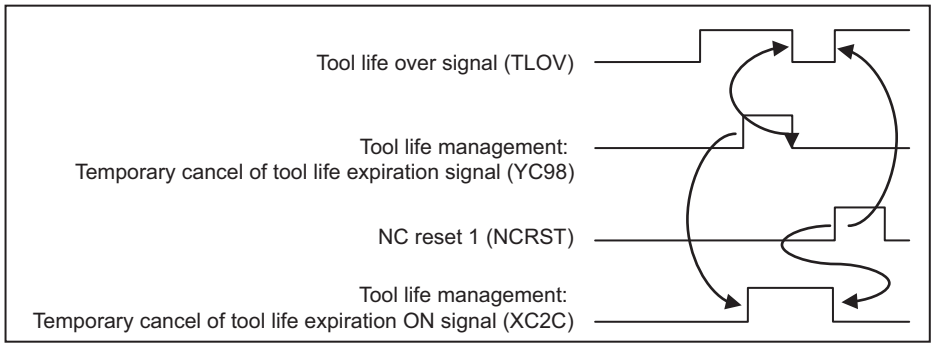
This signal temporarily cancels the Tool life over signal.

[Operation]

If the corresponding Tool life over signal is ON at the falling edge, this signal turns the Tool life over signal OFF.

The Tool life over signal that was temporarily canceled with this signal turns ON again if the lifetime of the tool that is used is expired after NC reset.

The timing chart for this signal is shown below.


Tool life over signal (TLOV)
Tool life management:
Temporary cancel of tool life expiration signal (YC98)
NC reset 1 (NCRST)
Tool life management:
Temporary cancel of tool life expiration ON signal (XC2C)

[Caution]

This signal is used only for resetting the Tool life over signal temporarily and does not affect other operations.

[Related signals]

(1) Tool life over (TLOV:XC2E)

(2) NC reset 1 (NRST1:YC18)

(3) NC reset 2 (NRST2:YC19)

(4) Reset & rewind (RRW:YC1A)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LIFE MANAGEMENT: TEMPORARY CANCEL OF TOOL GROUP LIFE EXPIRATION		YC99	YDD9	YF19	Y1059	Y1199	Y12D9	Y1419	Y1559

[Function]

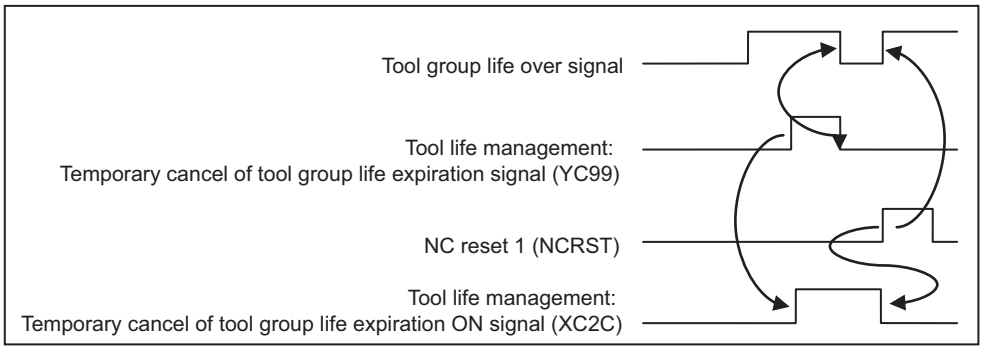
This signal temporarily cancels the Tool group life over signal.

[Operation]

If the corresponding Tool group life over signal is ON at the falling edge, this signal turns the Tool group life over signal OFF.

The Tool group life over signal that was temporarily canceled with this signal turns ON again if the lifetimes of all tools in a group that are mounted after NC reset are expired.

The timing chart for this signal is shown below.


Tool group life over signal
Tool life management:
Temporary cancel of tool group life expiration signal (YC99)
NC reset 1 (NCRST)
Tool life management:
Temporary cancel of tool group life expiration ON signal (XC2C)

[Caution]

This signal is used only for resetting the Tool group life over signal temporarily and does not affect other operations.

[Related signals]

(1) Tool group life over (XC2F)
(2) NC reset 1 (NRST1:YC18)
(3) NC reset 2 (NRST2:YC19)
(4) Reset & rewind (RRW:YC1A)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL SPEED COMMAND VALID		YC9D	YDDD	YF1D	Y105D	Y119D	Y12DD	Y141D	Y155D

[Function]

This signal is used to run the machining program with handle feedrate or JOG feedrate (manual feedrate).

[Operation]

After this signal is ON, manual speed (handle or manual feedrate) is applied to the axis feedrate in the whole automatic operation: the speed commanded in the program is not used.

If the program has not started, the automatic operation start is executed with handle or manual feedrate.

The manual operation mode decides whether the manual feedrate or handle feedrate is used.

- In handle mode

  The program under operation is executed at the feedrate of the 1st handle, 1st axis.

  During the reset, block stop or pause in the automatic operation mode, the automatic operation starts at the time when the handle feedrate has been commanded.

  When the reverse run is valid, a command in the (+) direction makes the movement as in the program, while a command in (-) direction reverses the movement against the program. The reversed movement, however, is available only within the current block.

- In JOG mode

  The program under operation is executed at the manual feedrate as long as the JOG mode signal is ON for the 1st axis.

  During the reset, block stop or pause in the automatic operation mode, the automatic operation starts at the time when the JOG mode has been turned ON.

  When the reverse run is valid, a command in the (+) direction makes the movement as in the program, while a command in (-) direction reverses the movement against the program. The reversed movement, however, is available only within the current block.

  When the "Rapid traverse" signal is ON, the axis moves at the rapid traverse feedrate.

[Caution]

(1) Turning ON this signal in the automatic operation leads the automatic operation pause.

(2) While this signal is ON, the "Automatic operation "start" command" signal is not valid.

(3) When the automatic operation is carried out with the manual speed command, the "In automatic operation "pause"" signal is output regardless of the axis movement.

(4) The manual speed command makes the movement follow the command on the 1st axis, even though the other axis is commanded in the program. Any commands to the other axes lead "M01 OPERATION ERROR 0005" (Internal interlock axis exists).

(5) The following G commands or modal make the movement different from that in the normal automatic operation.

G00: The manual feedrate is applied, not the rapid traverse feedrate.

G28: The manual feedrate is applied, not the reference position return feedrate.

G31: The manual feedrate is applied, not the skip feedrate. The movement when the skip signal is input, however, is the same as in the normal operation.

G33, G34 to 36 (L system): The thread cutting (G33), the variable lead thread cutting (G34: L system only), and the arc thread cutting (G35/36: L system only) operate the same as the dry run. The manual feedrate is applied. (When the parameter "#1247 set19/bit1" is set to "1", it operates according to the program command.)

G95: The feed per rotation operates the same as the dry run.

F1-digit feed: The manual feedrate is applied, not the F1-digit feedrate. The "F1-digit commanded" signal is not output, either.

(6) Only the 1st handle is used. The other handles are ignored.

(7) When this signal is valid, the feedrate is not changed by the Inch/Metric changeover command (G20/G21), nor by the rotary axis command speed tenfold.

(8) The manual interruption and the thread cutting cycle retract are available when this signal is ON. The automatic handle interruption, as well as the manual operation in the manual/auto simultaneous mode, cannot be used on the 1st axis because the axis applies the manual input upon this signal.

[Related signals]

(1) Manual speed command sign reversed (YC9E)
(2) Manual speed command reverse run valid (YC9F)
(3) In automatic operation "pause" (SPL: XC14)
(4) In manual speed command valid (XC48)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL SPEED COMMAND SIGN REVERSED		YC9E	YDDE	YF1E	Y105E	Y119E	Y12DE	Y141E	Y155E

[Function]

When the manual speed is commanded, this signal reverses the direction that has been commanded with the handle feed or JOG feed.

[Operation]

When this signal is ON, a speed command in the (+) direction reverses the movement against the program. (Note that this operation is not available unless the reverse run is valid.) A command in the (-) direction makes the movement as commanded in the program.

Manual speed command Reverse run valid	Manual speed command Sign reversed	Movement direction	
		by (+) operation	by (-) operation
OFF	(Invalid)	+	+
ON	OFF	+	-
ON	ON	-	+
In the modals that do not allow the reverse run (thread cutting and synchronous tapping)		+	The operation is ignored

[Caution]

This signal is not valid when the "Manual speed command Reverse run valid" signal is OFF.

[Related signals]

(1) Manual speed command valid (YC9D)
(2) Manual speed command reverse run valid (YC9F)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL SPEED COMMAND REVERSE RUN VALID		YC9F	YDDF	YF1F	Y105F	Y119F	Y12DF	Y141F	Y155F

[Function]

This signal allows the manual speed command in the (-) direction to reverse the movement against the program.

[Operation]

When this signal turns ON during the manual speed is commanded, a speed command in the (-) direction in handle or JOG mode reverses the movement against the program.

When this signal is OFF, a command in the (-) direction makes the same movement as commanded in the (+) direction: the movement follows the program.

[Caution]

(1) The reverse run is available within the block in execution. The reversed axis movement stops at the start point of the block in execution.

(2) Unless all the axes stop, this signal cannot be changed ON/OFF. The ON/OFF change of this signal during the axis movement is realized after all the axes have stopped.

(3) The reverse run is not allowed in the following operations. The axis stays stopped if a speed command is given in the (-) direction.

(a) In the reference position return (G28, G29). When G28 is commanded, however, the reverse run is available from the start point and to the intermediate point. When G29 is commanded, the reverse run is available from the intermediate point to the end point.

(b) In cutting cycle in the synchronous or asynchronous tap.

(c) In shift amount operation in a fixed cycle.

(d) In tool center point control.

(e) In normal line control.

(f) In milling interpolation, pole coordinate rotation or cylindrical interpolation.

(g) When the thread cutting command (G33) is given.

(h) In exponential interpolation.

(i) In spline interpolation.

(j) In NURBS interpolation.

(k) In tool change position return or 2nd/3rd/4th reference position return (from the intermediate point to the block end).

[Related signals]

(1) Manual speed command valid (YC9D)

(2) Manual speed command sign reversed (YC9E)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED 1ST AXIS SELECTION CODE m	CX11 to 116	YCA0 to 4	YDE0 to 4	YF20 to 4	Y1060 to 4	Y11A0 to 4	Y12E0 to 4	Y1420 to 4	Y1560 to 4

[Function]

This signal specifies a number of the axis component to move in manual arbitrary feed mode.
Components of up to three axes can be moved simultaneously in manual arbitrary feed mode. This signal is used to specify one of them.

[Operation]

(1) The "Manual arbitrary feed 1st axis selection code m" (CX11 to CX116) must be set before strobe signal CXS8 is turned ON. An attempt to set it during motion shall fail.

(2) Besides this signal (CX11 to CX116), there are two signals to specify a "Manual arbitrary feed 2nd axis selection code m" (CX21 to CX216) and a "Manual arbitrary feed 3rd axis selection code m" (CX31 to CX316). The axis numbers need not be specified in ascending order.

(3) The "Manual arbitrary feed 1st axis selection code m" is validated by turning ON the "Manual arbitrary feed 1st axis valid" (CX1S) signal explained later. Similarly, the "specific validity" signals (CX2S and CX3S) are also provided for the 2nd and 3rd axis number signals.

(4) Axis numbers can be specified as follows:

n: 1 to 3

Signal / Axis specification	CXnS	—	—	CXn16	CXn8	CXn4	CXn2	CXn1
1st axis	1	—	—	0	0	0	0	1
2nd axis	1	—	—	0	0	0	1	0
3rd axis	1	—	—	0	0	0	1	1
4th axis	1	—	—	0	0	1	0	0

Validity signal

Axis number

(5) Motion of the specified axis component is as follows:

(a) The motion of the axis component specified by the "Manual arbitrary feed 1st axis selection code m" signal corresponds to the contents of "Manual arbitrary feed 1st axis travel amount" (R2544 and R2545).

(b) The motion of the axis component specified by the "Manual arbitrary feed 2nd axis selection code m" signal corresponds to the contents of "Manual arbitrary feed 2nd axis travel amount" (R2548 and R2549).

(c) The motion of the axis component specified by the "Manual arbitrary feed 3rd axis selection code m" signal corresponds to the contents of "Manual arbitrary feed 3rd axis travel amount" (R2552 and R2553).

[Related signals]

For related signals, see the section "Manual arbitrary feed mode (PTP: YC03)."

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED 1ST AXIS VALID	CX1S	YCA7	YDE7	YF27	Y1067	Y11A7	Y12E7	Y1427	Y1567

[Function]

This signal is used to validate the axis specified by the "Manual arbitrary feed 1st axis selection code m" signal so that the axis component can move in manual arbitrary feed mode.

[Operation]

(1) The specification of the axis by the "Manual arbitrary feed 1st axis selection code m" signal explained earlier is validated only when the "CX1S" signal is turned ON.

[Related signals]

For related signal, see the section "Manual arbitrary feed mode (PTP: YC03)."

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED 2ND AXIS SELECTION CODE m	CX21 to 216	YCA8 to C	YDE8 to C	YF28 to C	Y1068 to C	Y11A8 to C	Y12E8 to C	Y1428 to C	Y1568 to C

[Function][Operation]

See the descriptions on the "Manual arbitrary feed 1st axis selection code m" signal (CX11 to CX116: YCA0 to 4) explained above.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED 2ND AXIS VALID	CX2S	YCAF	YDEF	YF2F	Y106F	Y11AF	Y12EF	Y142F	Y156F

[Function][Operation]

See the descriptions on the "Manual arbitrary feed 1st axis valid" signal (CX1S: YCA7).

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED 3RD AXIS SELECTION CODE m	CX31 to 316	YCB0 to 4	YDF0 to 4	YF30 to 4	Y1070 to 4	Y11B0 to 4	Y12F0 to 4	Y1430 to 4	Y1570 to 4

[Function][Operation]

See the descriptions on the "Manual arbitrary feed 1st axis selection code m" signal (CX11 to CX116: YCA0 to 4) explained above.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED 3RD AXIS VALID	CX3S	YCB7	YDF7	YF37	Y1077	Y11B7	Y12F7	Y1437	Y1577

[Function][Operation]

See the descriptions on the "Manual arbitrary feed 1st axis valid" signal (CX1S: YCA7).

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED SMOOTHING OFF	CXS1	YCB8	YDF8	YF38	Y1078	Y11B8	Y12F8	Y1438	Y1578

[Function]

This signal is used to move an axis component under the condition where the acceleration/ deceleration time constant is 0 in manual arbitrary feed mode.

[Operation]

With the "Manual arbitrary feed smoothing off" (CXS1) signal set ON, axis motion in manual arbitrary feed mode is performed under the same conditions as when the acceleration/deceleration time constant is set to 0.

(Note 1) When using this signal to move an axis component under the condition where the acceleration/deceleration time constant is 0, move it at a slow speed. Otherwise, a servo alarm (excess error) may occur.

[Related signals]

For related signal, see the section "Manual arbitrary feed mode" (PTP: YC03) mode.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED AXIS INDEPENDENT	CXS2	YCB9	YDF9	YF39	Y1079	Y11B9	Y12F9	Y1439	Y1579

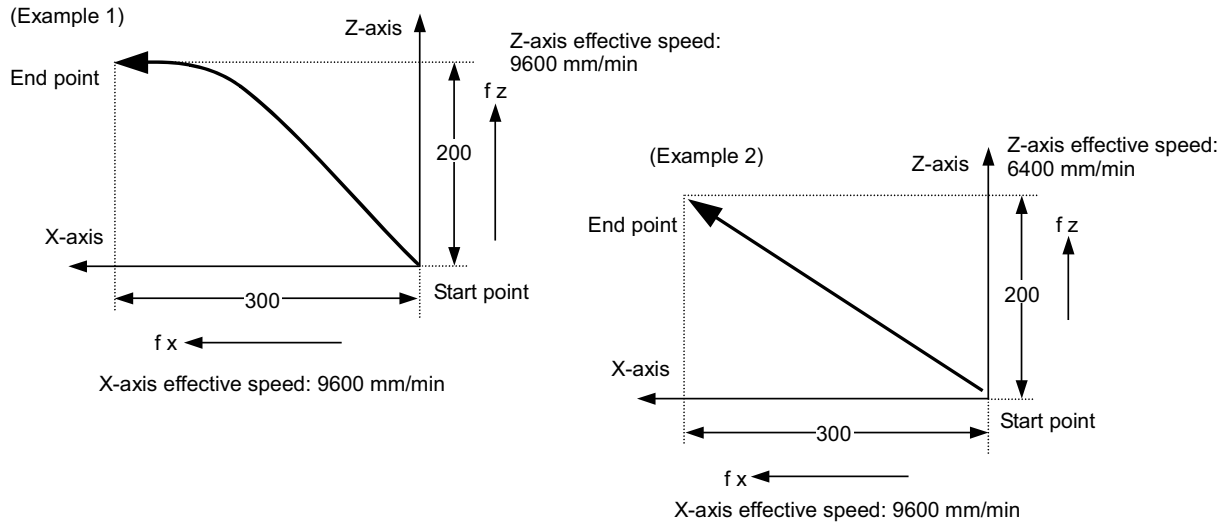
[Function]

When moving two or more axis components simultaneously in "manual arbitrary feed" mode, this signal can be used to position each axis independently without performing interpolation.

[Operation]

When a manual arbitrary feed is executed for two or more axes at the same time with CXS2 ON, each axis is positioned independently without being subjected to interpolation.The "CXS2" signal is generally used when the "Manual arbitrary feed G0/G1" signal (CXS4) explained later is OFF (G0 selected).

The following is an example where the rapid traverse speeds of X-axis and Z-axis are both set to 9,600 mm/min, and the amounts of movement of X-axis and Z-axis are set to 300mm and 200mm respectively.



[Related signals]

For related signal, see the section "Manual arbitrary feed mode (PTP: YC03)."

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED EX. F/MODAL. F	CXS3	YCBA	YDFA	YF3A	Y107A	Y11BA	Y12FA	Y143A	Y157A

[Function]

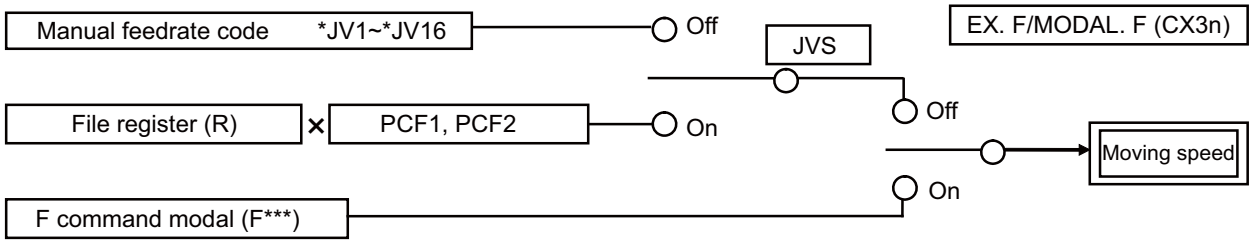
This signal selects whether a manual arbitrary feed in G1 mode is done at manual feed rate or at modal speed in automatic operation.

[Operation]

When the "Manual arbitrary feed G0/G1" (CXS4) signal explained later is ON n, the "CXS3" signal works as follows:

(1) When Manual arbitrary feed EX.F/MODAL.F (CXS3) is OFF:
When the "Manual feedrate method selection (JVS)" signal is OFF, the speed selected by the manual feedrate code (*JV1 to 16) applies.When the "Manual feedrate method selection (JVS)" signal is ON, the applicable speed is determined by the relation between the contents of the corresponding file register (R) and the "Feedrate least increment code 1,2" signal (PCF1 or PCF2).

(2) When Manual arbitrary feed EX.F/MODAL.F (CXS3) is ON:
Manual arbitrary feed is done at a modal speed (F***) set in automatic operation. However, manual arbitrary feed will not be done, if no F command has been executed before.



[Related signals]

For related signal, see the section "Manual arbitrary feed mode (PTP: YC03)."

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED G0/G1	CXS4	YCBB	YDFB	YF3B	Y107B	Y11BB	Y12FB	Y143B	Y157B

[Function]

This signal selects a manual feed speed or rapid traverse speed in manual arbitrary feed mode.

[Operation]

This signal operates as shown below depending on the status of the "Manual arbitrary feed G0/G1" (CXS4) signal.

(1) When the "Manual arbitrary feed G0/G1" signal is OFF:
The rapid traverse speed originally set to the corresponding axis applies. Rapid traverse override is also valid. The rapid traverse speed applicable when moving two or more axis components at the same time varies with the status of the "Manual arbitrary feed axis independent (CXS2)" signal. See the descriptions on the "Manual arbitrary feed axis independent (CXS2)" signal.

(2) When the "Manual arbitrary feed G0/G1" signal is ON:
The manual feed speed or the speed specified by the F command in automatic operation apply. For details, see the description on the Manual arbitrary feed EX.F/MODAL.F (CXS3).

[Related signals]

For related signal, see the section "Manual arbitrary feed mode (PTP: YC03)."

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED MC/WK	CXS5	YCBC	YDFC	YF3C	Y107C	Y11BC	Y12FC	Y143C	Y157C

[Function]

This signal selects a machine coordinate system or a modal workpiece coordinate system on which positioning is done in manual arbitrary feed mode.

[Operation]

The "Manual arbitrary feed MC/WK (CXS5)" signal becomes valid when the "Manual arbitrary feed ABS/INC (CXS6)" signal explained later is OFF in manual arbitrary feed mode.

(1) When the "Manual arbitrary feed MC/WK" signal is OFF:
"Manual arbitrary feed n-th axis travel amount" set in a file register (R) is used for positioning on the machine coordinate system.

Amount of motion = Manual arbitrary feed n-th travel amount - Coordinate value on machine coordinate system

(2) When the "Manual arbitrary feed MC/WK" signal is ON:
"Manual arbitrary feed n-th axis travel amount" set in a file register (R) is used for positioning on the modal workpiece coordinate system.

Amount of motion = Manual arbitrary feed n-th travel amount - Coordinate value on modal workpiece coordinate system

[Related signals]

For related signal, see the section "Manual arbitrary feed mode (PTP: YC03)."

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED ABS/INC	CXS6	YCBD	YDFD	YF3D	Y107D	Y11BD	Y12FD	Y143D	Y157D

[Function]

This signal selects whether travel amount is given in an absolute value or incremental value for manual arbitrary feed.

[Operation]

(1) When the "Manual arbitrary feed ABS/INC" (CXS6) signal is OFF:
"Manual arbitrary feed n-th axis travel amount" set in a file register (R) is handled as an absolute value. For details, see the descriptions on the "Manual arbitrary feed MC/WK (CXS5)" signal explained before.

(2) When the "Manual arbitrary feed ABS/INC" signal is ON:
"Manual arbitrary feed n-th axis travel amount" set in a file register (R) is handled as a real movement value.

[Related signals]

For related signal, see the section "Manual arbitrary feed mode (PTP: YC03)."

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
B	MANUAL ARBITRARY FEED STOP	*CXS7	YCBE	YDFE	YF3E	Y107E	Y11BE	Y12FE	Y143E	Y157E

[Function]

This signal stops an ongoing axis component halfway in manual arbitrary feed mode.

The function of this signal is equivalent to those of the "Manual interlock+ n-th axis" (*+MITn) and "Manual interlock- n-th axis" (*-MITn) signals.

[Operation]

Turning the "Manual arbitrary feed stop" signal (*CXS7) OFF (0) causes the following:

(1) Motion of axis in manual arbitrary feed mode is decelerated and stopped.

(2) The axis component which is going to move in manual arbitrary feed mode remains stopped.
When the "Manual arbitrary feed stop" (*CXS7) signal is turned ON (1) while an axis component is in the stop state, it immediately restarts the operation.

(Note 1) When the power is turned ON, the "Manual arbitrary feed stop" (*CXS7) signal is automatically set to "1". If the "Manual arbitrary feed stop" signal is not to be used, there is no need to make a sequence program for it.

[Related signals]

For related signal, see the "Manual arbitrary feed mode (PTP: YC03)."

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED STROBE	CXS8	YCBF	YDFF	YF3F	Y107F	Y11BF	Y12FF	Y143F	Y157F

[Function]

This signal is a trigger signal for moving an axis component in manual arbitrary feed mode. The axis component starts moving at the rising edge of this signal.

[Operation]

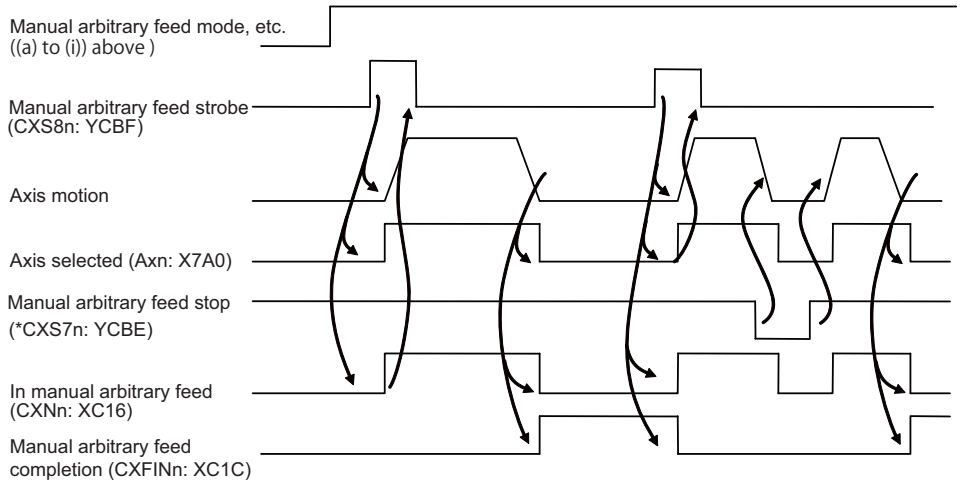
The "Manual arbitrary feed strobe" signal (CXS8) should be turned ON after all signal values necessary for manual arbitrary feed are set appropriately.

(1) The following signals must be appropriately set before turning ON the "Manual arbitrary feed strobe" signal:
- (a) Manual arbitrary feed mode (PTP)
- (b) Manual arbitrary feed n-th axis selection code (CXn1 to CXn16) and manual arbitrary feed n-th axis valid (CXnS)
- (c) Manual arbitrary feed n-th axis travel amount (file registers R2544 to R2553)
- (d) Manual arbitrary feed smoothing OFF (CXS1)
- (e) Manual arbitrary feed axis independent (CXS2)
- (f) Manual arbitrary feed EX.F/MODAL.F (CXS3)
- (g) Manual arbitrary feed G0/G1 (CXS4)
- (h) Manual arbitrary feed MC/WK (CXS5)
- (i) Manual arbitrary feed ABS/INC (CXS6)

(2) The following signals can be changed even after the "Manual arbitrary feed strobe" signal is turned ON:
- (j) Manual feed speed code m
- (k) Rapid traverse override for a rapid traverse speed when the "Manual arbitrary feed G0/G1" signal (CXS4) is OFF.
- (l) Manual arbitrary feed stop (*CXS7)

(Note 1) The "Manual arbitrary feed strobe" signal can be accepted even when the "Manual arbitrary feed stop" signal (*CXS7) is OFF (0).

Example of operation timing chart



(Note 2) The "Manual arbitrary feed strobe" signal (CXS8) must be ON for at least 100ms.

[Related signals]

Signals listed in (a) to (l) above

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CURRENT LIMIT MODE 1	ILM1	YCC0	YE00	YF40	Y1080	Y11C0	Y1300	Y1440	Y1580
A	CURRENT LIMIT MODE 2	ILM2	YCC1	YE01	YF41	Y1081	Y11C1	Y1301	Y1441	Y1581

[Function]

This signal selects process of current limit reached.

[Operation]

When the current reaches its limit during current control, the "current limit reached" signal will be output, and the following mode will be selected and performed.

Current limit mode 2	Current limit mode 1	Mode
0	0	Normal
0	1	Interlock
1	0	Normal
1	1	Normal

(1) Normal mode
Movement command is executed in the current state.
In automatic operation, the movement command is executed to the end and moves to the next block with droops accumulated.

(2) Interlock mode
Movement command is blocked (internal interlock).
In automatic operation, the operation stops at the corresponding block and does not move to the next block.
In manual operation, the subsequent commands to the same direction will be ignored.

[Related signals]

(1) In current limit n-th axis (ILI1 to 8: X900 to X907)
(2) Current limit reached n-th axis (ILA1 to 8: X920 to X927)
(3) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to Y9A7)
(4) Droop release request n-th axis (DOR1 to 8: Y9C0 to Y9C7)
(5) Current limit changeover (R2593)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : TEACHING/MONITOR EXECUTION	LDWT	YCC3	YE03	YF43	Y1083	Y11C3	Y1303	Y1443	Y1583

[Function]

Teaching and monitoring is executed.

[Operation]

The teaching or monitor mode is valid from the point that this signal turns ON during automatic operation.
Whether to carry out teaching or monitoring follows the teaching mode and monitor mode input signal.
The teaching and monitor mode is invalidated at the point this signal turns OFF.

[Caution]

(1) Select the teaching mode or monitor mode before turning this signal ON.
This signal will not be validated if the teaching mode or monitor mode is not selected.
(2) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)
(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)
(3) Load monitor I : Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC4 to YCC7)
(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)
(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : TEACHING MODE		YCC4	YE04	YF44	Y1084	Y11C4	Y1304	Y1444	Y1584

[Function]

The teaching mode is selected.

[Operation]

Turn this signal ON to select the teaching mode.

The teaching mode is actually validated when this signal turns ON and then the teaching/monitor valid signal turns ON.

[Caution]

(1) Do not turn the monitor mode input signal ON when turning this signal ON.

(2) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)

(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)

(3) Load monitor I : Teaching/Monitor execution, Monitor mode, Alarm reset, Warning reset (YCC3,YCC5 to YCC7)

(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)

(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : MONITOR MODE		YCC5	YE05	YF45	Y1085	Y11C5	Y1305	Y1445	Y1585

[Function]

The monitor mode is selected.

[Operation]

Turn this signal ON to select the monitor mode.

The monitor mode is actually validated when this signal turns ON and then the teaching/monitor valid signal turns ON.

[Caution]

(1) Do not turn the teaching mode input signal ON when turning this signal ON.

(2) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)

(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)

(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Alarm reset, Warning reset (YCC3,YCC4,YCC6,YCC7)

(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)

(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : ALARM RESET		YCC6	YE06	YF46	Y1086	Y11C6	Y1306	Y1446	Y1586

[Function]

This signal resets the alarm signal of the load monitor I function.

[Operation]

If this signal is turned ON when the alarm axis and data alarm information bit are ON, each alarm bit will turn OFF.

The warning information is reset simultaneously.

[Caution]

(1) This signal is used to clear the alarm information and does not affect the other operations.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)

(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)

(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Warning reset (YCC3 to YCC5,YCC7)

(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)

(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : WARNING RESET		YCC7	YE07	YF47	Y1087	Y11C7	Y1307	Y1447	Y1587

[Function]

The warning signal is reset.

[Operation]

If this signal is turned ON when the warning axis information bit is ON, each warning bit will turn OFF.

[Caution]

(1) This signal does not clear the alarm information.

(2) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)

(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)

(3) Load monitor I : Teaching/Monitor execution, Teaching mode/Monitor mode, Alarm reset (YCC3 to YCC6)

(4) Load monitor I : Axis selection, Load change rate detection axis, Teaching data sub-No. (R2580 to R2582)

(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
B	2ND REFERENCE POSITION RETURN INTERLOCK	*ZRIT	YCC8	YE08	YF48	Y1088	Y11C8	Y1308	Y1448	Y1588

[Function]

The axis is interlocked at a designated position during manual 2nd reference position return.

[Operation]

During 2nd reference point return while this signal is valid (base specification parameter "#1505 ckref2" is "1"), if this signal turns OFF, movement of axes that have reached the designated position will stop, and an interlock will be applied. Axes that have not reached the designated position will be interlocked after reaching the designated position.

When this signal is ON, the axis movement will not stop, and the 2nd reference position return will continue.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : ADAPTIVE CONTROL EXECUTION		YCC9	YE09	YF49	Y1089	Y11C9	Y1309	Y1449	Y1589

[Function]

This signal is input to execute adaptive control.

[Operation]

Adaptive control will start if this signal is turned ON during load monitor execution.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Adaptive control in execution (XCA3)

(2) Load monitor I : Adaptive control override (R571)

(3) Load monitor I : Adaptive control basic axis selection (R2583)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SMALL DIAMETER DEEP HOLE DRILLING CYCLE		YCCA	YE0A	YF4A	Y108A	Y11CA	Y130A	Y144A	Y158A

[Function]

The cutting operation of the samll diameter deep hole drililng cycle is skipped.

[Operation]

The remaining cutting command is skipped and move on to the next operation by turning ON this signal during the cutting operation of the small diameter deep hole drilling cycle.

[Caution]

The cutting opearation is skipped when this signal is turned ON.

[Related signals]

(1) In small diameter deep hole cycle (XCC1)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	HIGH-SPEED RETRACT FUNCTION VALID		YCCC	YE0C	YF4C	Y108C	Y11CC	Y130C	Y144C	Y158C

[Function]

When executing a fixed cycle, the axis will be retracted at a high-speed from the bottom of the hole.

[Operation]

If the fixed cycle program (G81/G82/G83/G73) is executed while this signal is ON, the axis will be retracted at a high-speed from the bottom of the hole.

[Caution]

(1) High-speed retract will not be executed even if this signal is turned ON during the fixed cycle. Always turn the signal ON before the fixed cycle command, and hold the state until the fixed cycle command is completed.

(2) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) High-speed retract function valid state (XCC2)

(2) In high-speed retract function operation (XCC3)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TIMING SYNCHRONIZATION IGNORE		YCD0	YE10	YF50	Y1090	Y11D0	Y1310	Y1450	Y1590

[Function]

This signal is used to designate whether to execute the timing synchronization between part systems by M code or not.

[Operation]

1:The timing synchronization by M code is not executed. The M code to execute timing synchronization commanded during the machining program is ignored.

0:The timing synchronization by M code is executed. If the M code to execute timing synchronization is commanded in one part system, the execution of the next block starts after the same M code is commanded in the other part system.

(Note 1) With the M code for timing synchronization, the code signal and strobe signal are not output differently from the other M code.

(Note 2) The M code during the machining program can be ignored with the "Timing synchronization ignore" signal. The operation is possible only in the single part system without deleting the M code during the machining program.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SPINDLE-SPINDLE POLYGON CANCEL		YCD1	YE11	YF51	Y1091	Y11D1	Y1311	Y1451	Y1591

[Function]

Spindle-spindle polygon machining is canceled.

[Operation]

If this signal is input during spindle-spindle polygon, the spindle-spindle polygon machining mode will be canceled.

[Related signals]

(1) In spindle-spindle polygon mode (XCB2)

(2) Spindle-spindle polygon synchronization completion (XCB3)

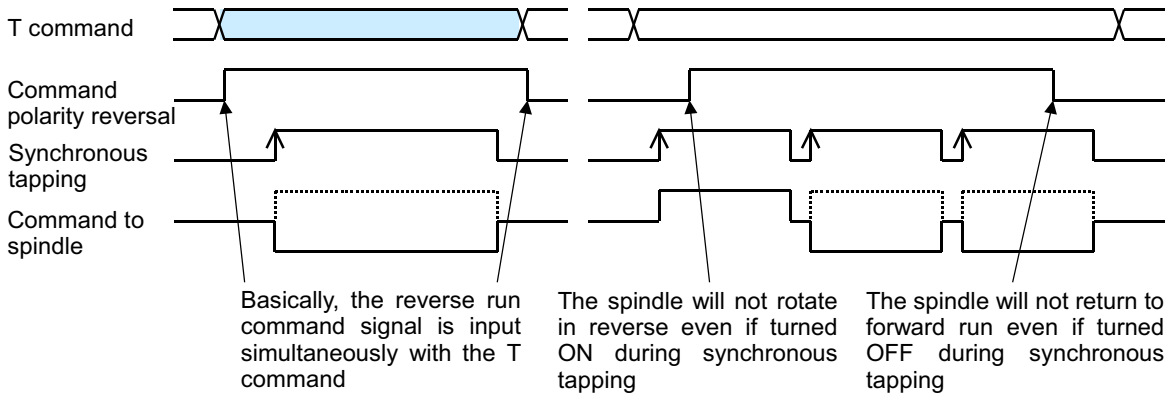
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SYNCHRONOUS TAPPING COMMAND POLARITY REVERSAL		YCD2	YE12	YF52	Y1092	Y11D2	Y1312	Y1452	Y1592

[Function]

Designate whether to rotate the spindle in reverse during synchronous tapping.

[Operation]

When the "Synchronous tapping command polarity reversal" signal is ON, the spindle will rotate in reverse during synchronous tapping.


T command
Command polarity reversal
Synchronous tapping
Command to spindle
Basically, the reverse run command signal is input simultaneously with the T command
The spindle will not rotate in reverse even if turned ON during synchronous tapping
The spindle will not return to forward run even if turned OFF during synchronous tapping

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SPINDLE OFF MODE		YCD3	YE13	YF53	Y1093	Y11D3	Y1313	Y1453	Y1593

[Function]

This function is used to check the program by moving the machine without rotating the spindle.

[Operation]

(1) Synchronized tapping mode

When the spindle OFF mode is turned ON, the spindle will not rotate even if the servo is turned ON.

During the synchronized tapping mode, the operation up to when the synchronized tapping mode turns OFF will not change even if the spindle OFF mode is changed.

This signal should be ON from the start of operation.

(2) Asynchronous tapping mode

(a) During synchronous (per revolution) feed

In addition to M03, M04 processing and dry run signal, turn the spindle OFF mode ON.The program will advance when the signal is turned ON.

(b) During asynchronous feed (per minute) feed

The program will advance even if the spindle OFF mode is not turned ON.

(3) Thread cutting

If "#1279 ext15/bit4 (dry run OFF during thread cutting)" is "1", the dry run is disabled for thread cutting. However, when the spindle OFF mode signal is ON, dry run is enabled regardless of the parameter, so the status of dry run is determined by the dry run signal.

ext15/bit4	Dry run	Spindle OFF mode	Thread cutting motion
0	0	0/1	Command speed
0	1	0/1	Dry run speed
1	0	0/1	Command speed
1	1	0	Command speed
1	1	1	Dry run speed

[Related signals]

(1) Dry run (DRN:YC15)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TAP RETRACT POSSIBLE STATE CANCEL	TRVEC	YCD6	YE16	YF56	Y1096	Y11D6	Y1316	Y1456	Y1596

[Function]

Turning ON this signal allows to move the axis, both automatically and manually, without tap retract.

This signal is used when the spindle rotation with tap retract may cause danger; when the tap is damaged, for example.

[Operation]

Turning this signal ON turns OFF the "Tap retract possible" (TRVE) signal.

[Related signals]

(1) Tap retract (TRV: YC5C)

(2) Tap retract possible (TRVE: XCA5)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CHOPPING COMPENSATION UPDATE PREVENTION REQUEST	CHPRCR	YCD7	YE17	YF57	Y1097	Y11D7	Y1317	Y1457	Y1597

[Function] [Operation]

This signal prevents the chopping compensation amount from being updated.

[Related signals]

(1) Chopping compensation update prevented (CHPRCC)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	BARRIER VALID (LEFT)		YCD8	YE18	YF58	Y1098	Y11D8	Y1318	Y1458	Y1598
A	BARRIER VALID (RIGHT)		YCD9	YE19	YF59	Y1099	Y11D9	Y1319	Y1459	Y1599

[Function]

This signal is used to validate the left (right) barrier range for the chuck/tailstock barrier function.

[Operation]

The chuck/tailstock barrier function's barrier range is validated when this signal turns ON. If the tool nose attempts to enter the range, an error will occur.

Note that to validate the barrier function, this signal must be ON, and the parameter "#8310 Barrier ON" must be set to "1", and "#8315 BARRIER TYPE (L)" ("#8316 BARRIER TYPE (R)") must not be set to "0" on the BARRIER screen. (Excluding when using a special display unit.)

The barrier range validity can also be changed with the G22/G23 command instead of this signal input. In this case, the left and right settings will change simultaneously. (There are some systems with which G22/G23 cannot be commanded because of the selected G code system.)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL PRESETTER SUB-SIDE VALID		YCDA	YE1A	YF5A	Y109A	Y11DA	Y131A	Y145A	Y159A

[Function]

Select whether to measure the tool compensation amount on the main spindle side or sub-spindle side.

[Operation]

OFF:The tool compensation No. is acquired from the main spindle side R registers used for the setting of compensation No.

ON:The tool compensation No. is acquired from the sub spindle side R registers used for the setting of compensation No.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	HOB MACHINING: RETRACT REQUEST	HOBRTR	YCDE	YE1E	YF5E	Y109E	Y11DE	Y131E	Y145E	Y159E

[Function]

This signal is used to implement retract during hob machining.

[Operation]

When signal is ON during hobbing, it starts retract (moving axis): and stops automatic operation.

Retracing speed and movement amount are set by the parameter below

Movement amount: "#8219 hob retract amount 1" and "#8220 hob retract amount 2"

Speed: "#8221 hob retract speed"

Retract operation will continue even if the signal is turned OFF during retract operation.

[Related signals]

(1) Hob machining: retract amount selection (HOBRTV:YB20)

(2) Hob machining: retracting (HOBRTM:XCAE)

(3) Hob machining: retract complete (HOBRTF:XCAF)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	HOB MACHINING: ALARM RETRACT INHIBIT	HOBART-TC	YCDF	YE1F	YF5F	Y109F	Y11DF	Y131F	Y145F	Y159F

[Function]

This signal is used to inhibit retract operation caused by an alarm during hob machining.

[Operation]

While this signal is ON, retract operation is not carried out even if a program error or operation error occurs during hob machining.

Whether to perform retract at a program error or operation error while this signal is OFF is determined by the parameter "#19406 Hob retract ON at alarm".

Retract operation will not stop if this signal is turned ON during retracting.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	DOOR OPEN II	DOOR2	YCE1	YE21	YF61	Y10A1	Y11E1	Y1321	Y1461	Y15A1

[Function]

This signal stops all axes, and cuts OFF contactor power.

[Operation]

The NC carries out the following operations when the "Door open II" signal turns ON.

(1) A deceleration stop is carried out for all axes (servo axes and spindles). (Axis interlock)

(2) After all axes stop, the contactor power of each drive unit is cut OFF. The "Servo ready completion" signal (SA) does not turn OFF.

(3) The "Door open enable" signal turns ON.

The NC carries out the following operations when the "Door open II" signal turns OFF.

(1) A ready ON and servo ON state occurs for all axes.

(2) The "Door open enable" signal turns OFF.

[Caution]

(1) Handling of the PLC axis

Set so a "Door open" signal is output to the NC after the PLC axis is stopped by the PLC.

If a "Door open" signal is input without stopping the PLC axis, the axis will stop with a dynamic brake method due to the ready OFF state.

The remaining distance will be held in the R register being used in the PLC axis control.

(2) Handling of the analog spindle

When an analog spindle is connected, it is not possible to confirm that the spindle has completely stopped with the NC. Thus, confirm that the spindle has completely stopped using the PLC, before opening the door.

Because the spindle may start rotating again immediately after the door is closed, for safety turn the forward run and reverse run signals OFF when the door is open.

(3) Opening the door during ATC operation

When opening the door during ATC operation, apply an interlock with the user PLC.

[Related signals]

(1) Door open enable (DROPNS: XCD8)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	DOOR OPEN SIGNAL INPUT (spindle speed monitor)		YCE2	YE22	YF62	Y10A2	Y11E2	Y1322	Y1462	Y15A2

[Function]

This signal informs the door open or close state to the spindle drive unit with the spindle speed monitor function.

[Operation]

"1" is entered in the door open state.

The compatibility check of this signal and the door close signal connected with the spindle drive unit is performed in the spindle drive unit.

If those signals are not compatible for continuous 3 seconds, the servo alarm (5D) will occur.

[Related signals]

(1) Door open enable (DROPNS: XCD8)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	DOOR INTERLOCK SPINDLE SPEED CLAMP		YCE3	YE23	YF63	Y10A3	Y11E3	Y1323	Y1463	Y15A3

[Function]

This signal is used to change the spindle's clamp speed.

[Operation]

When the "Door interlock spindle speed clamp" signal is turned ON, the spindle rotation speed will be limited by the set clamp speed value.

The relation of the "Door interlock spindle speed clamp" signal and the clamp speed parameter in each operation is shown below.

Spindle operation	Clamp speed parameter (spindle parameter)	
	Door interlock spindle speed clamp OFF	Door interlock spindle speed clamp ON
Orientation (multi-point orientation)	#3205 SP005	#3315 SP115
Turret indexing	#3312 SP112	#3211 SP011
Synchronized tapping (zero point return)	#3414 SP214	#3315 SP115
Spindle C axis (C axis zero point return)	#3349 SP149	#3315 SP115

[Caution]

(1) This signal is valid only when the door interlock spindle clamp speed valid parameter "#1239 set11 BIT5" is set to "1".

(2) The clamp speed parameter setting value validated when the "Door interlock spindle speed clamp" signal is ON must always be set smaller than the original clamp speed setting value (clamp speed valid when signal is OFF). The clamp speed will change when the signal turns ON regardless of the size of the parameter setting values.

(3) Do not change the state of the "Door interlock spindle speed clamp" signal during multi-point indexing. The clamp speed will change if the signal state is changed during operation.

(4) Even if the "Door interlock spindle speed clamp" signal is changed during orientation, during zero point return at synchronized tapping, or during reference position return after changing from the spindle mode to the C axis mode under the spindle/C-axis control function, the clamp speed will not change. The rotation speed is clamped by the clamp speed set with the signal state before each operation is executed.

(5) The target for changing the clamp speed with the "Door interlock spindle speed clamp" signal differs according to the "#1154 pdoor" setting and system configuration. The combinations are shown below.

#1154 pdoor setting value	No. of part systems	Door interlock spindle speed clamp
0	1	YCE3
0	2	YCE3
1	1	YCE3
1	2	YCE3

(6) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : CUTTING TORQUE ESTIMATION EXECUTION		YCEF	YE2F	YF6F	Y10AF	Y11EF	Y132F	Y146F	Y15AF

[Function]

This signal is input when performing cutting torque estimation.

[Operation]

While cutting torque is being estimated, keep this signal ON until “Cutting torque estimation Completed” turns ON. When YCEF is turned OFF, the estimation operation is discontinued.

Turn OFF this signal at the rising edge of “Cutting torque estimation Completed”.

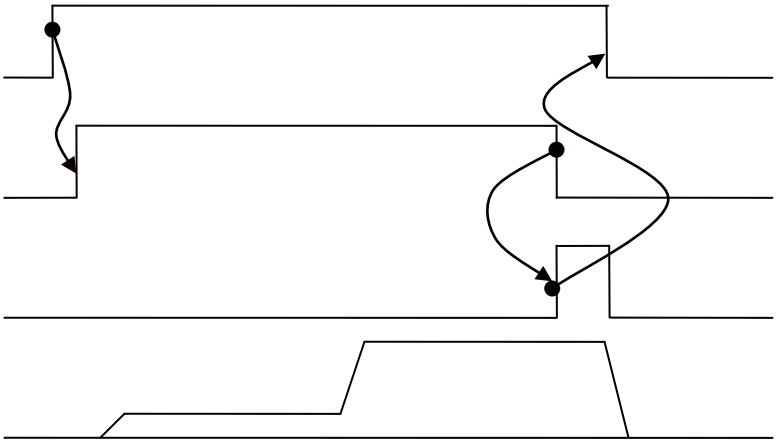
(Note) Estimation is also discontinued by Reset input. If you input Reset, make sure to turn OFF this signal.

YCEF (PLC → NC)
Load monitor I :
Cutting torque estimation execution

XCEE (NC → PLC)
Load monitor I :
Cutting torque estimation in progress

XCEF (NC → PLC)
Load monitor I :
Cutting torque estimation completed

Spindle rotation speed



[Related signals]

(1) Load monitor I : Cutting torque estimation in progress (XCEE)
(2) Load monitor I : Cutting torque estimation completed (XCEF)
(3) Load monitor I : Spindle cutting torque output value (R6528)
(4) Load monitor I : Cutting torque estimation target axis (R22692)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY REVERSE RUN: REVERSE RUN BLOCK STOP DESIG-NATED PART SYSTEM	RBSSY	YCF1	YE31	YF71	Y10B1	Y11F1	Y1331	Y1471	Y15B1

[Function]

Turning this signal ON specifies the part system in which single-block stop occurs when reverse run is executed during the manual arbitrary reverse run.

[Operation]

- This signal is ON.
- The "Single block with part systems synchronized" is ON
- Modal information memory block

Block stop occurs for reverse run only when all of the above three conditions are met.

[Related signals]

(1) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)
(4) Single block with part systems synchronized (MSBK:Y73A)
(5) Manual arbitrary reverse run mode (MORR:Y73C)
(6) Manual arbitrary reverse run speed selection (MORSP:Y73D)
(7) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)
(8) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG:YCFC)
(9) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	BARRIER CHECK INVALID	BCHK	YCF4	YE34	YF74	Y10B4	Y11F4	Y1334	Y1474	Y15B4

[Function]

This signal invalidates barriers of chuck barrier and tail stock barrier (G22).

[Operation]

When the signal is ON, it invalidates chuck barrier and tail stock barrier regardless of chuck barrier and tail stock barrier command (G22/G23) ON/OFF in machining program.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SYNCHRONIZATION BETWEEN PART SYSTEMS OFF	MSYNC	YCF8	YE38	YF78	Y10B8	Y11F8	Y1338	Y1478	Y15B8

[Function]

This signal disables the functions for synchronization between part systems such as the "Single block with part systems synchronized" (MSBK) operation.

[Operation]

If the "Synchronization between part systems OFF" (MSYNC) signal is ON, the functions for synchronization between part systems such as the "Single block with part systems synchronized" (MSBK) operation are ignored.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	DRY RUN INVALID	DRNC	YCFA	YE3A	YF7A	Y10BA	Y11FA	Y133A	Y147A	Y15BA

[Function]

This signal invalidates dry run in dry run operation.

[Operation]

When the "dry run invalid (DRNC)" signal is ON, NC operates at designated speed, ignoring the dry run function (DRN).

[Related signals]

Dry run (DRN: YC15)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	AUTOMATIC ERROR DETECTION	AUTED	YCFB	YE3B	YF7B	Y10BB	Y11FB	Y133B	Y147B	Y15BB

[Function]

With the "Automatic error detection" (AUTED) signal, the timing for starting the next cutting block is controlled until the amount of position error becomes equal to or less than the parameter value (corner deceleration check width), in order to cut edges with high precision.

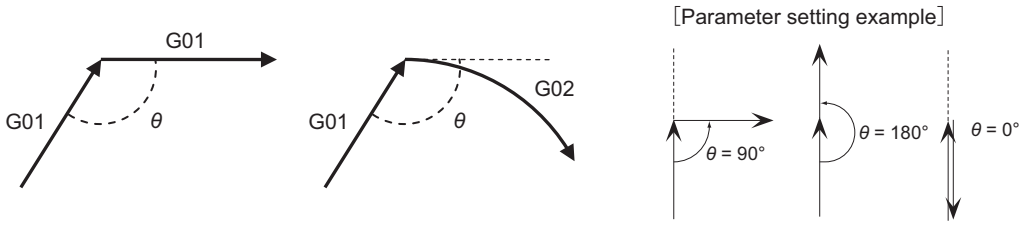
The timing for starting the next block is controlled when the result of corner angle calculation is smaller than the parameter value (corner deceleration check angle).

[Operation]

The following operation is performed when the "Automatic error detection" (AUTED) signal is ON.

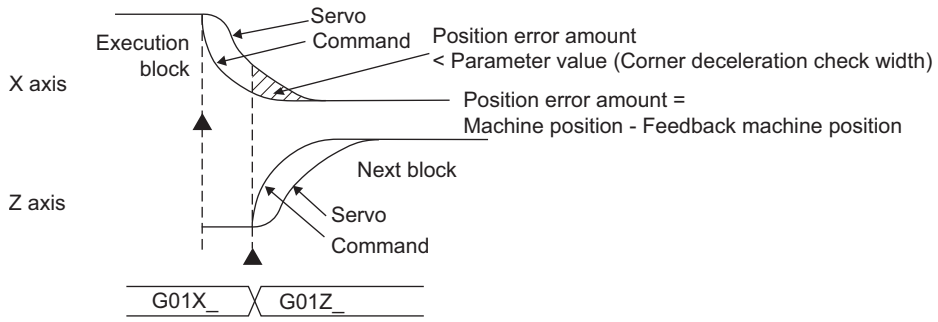
<Corner angle calculation control>

The timing for starting the next cutting block is controlled only when the corner angle θ (interior angle) calculated for consecutive cutting blocks is equal to or smaller than the parameter value (corner deceleration check angle). The timing for starting the next cutting block is not controlled when the corner angle is larger than the parameter value. Angle calculation is performed for the plane axis selected with the plane selection command. Angle calculation is not performed for the rotational axes.



<Start timing control>

Checking the amount of error is started after deceleration starts in the currently executed block. The next cutting block starts when the amount of error (remaining distance after composition) between the machine position of the target axis and the feedback machine position becomes equal to or less than the parameter value (corner deceleration check width).



(Note) Turn OFF the normally used Error detection (ERD) signal before using the "Automatic error detection" (AUTED) signal. If the Error detection (ERD) signal is ON, the normal error detection is given priority.

[Related signals]

(1) Error detection (ERD:YC17)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY REVERSE RUN: MSTB REVERSE RUN PROHIB-ITED	MRPSG	YCFC	YE3C	YF7C	Y10BC	Y11FC	Y133C	Y147C	Y15BC

[Function]

Turning this signal ON can prohibit reverse run of an MSTB command, which is executed when manual arbitrary reverse run operation is in the forward run, in a part system.

[Operation]

By inputting the "MSTB reverse run prohibited" signal from the ladder, reverse run of any MSTB in a machining program can be prohibited.

If this signal turns ON when an MSTB is completed in the forward run, reverse run prohibition that can be set for each part system is set for the MSTB block.

[Caution]

(1) This signal is enabled only when an MSTB is completed (when the NC inputs FIN signal) in the forward run. This signal is disabled in the reverse run.

(2) If this signal is input when the Miscellaneous Function High-speed Output is enabled, the NC inputs FIN signal in a block that follows the MSTB command block. Therefore, reverse run prohibition is set for a block being executed when FIN signal is input.

```
G0 X100. ;
M10;          ←  If this M command is the Miscellaneous Function High-speed Output command,
                 operation goes to the next block without waiting for FIN signal.
G1 Z200. ;
G0 X50. ;     ←  If FIN signal and the "MSTB reverse run prohibited" signal are input while this block is
                 executed, reverse run is prohibited for this block.
    :
    :
```

[Related signals]

(1) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)
(4) Manual arbitrary reverse run mode (MORR:Y73C)
(5) Manual arbitrary reverse run speed selection (MORSP:Y73D)
(6) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)
(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY YCF1)
(8) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	REVERSE RUN FROM BLOCK START	RVSP	YD08	YE48	YF88	Y10C8	Y1208	Y1348	Y1488	Y15C8

[Function]

This signal is used to designate where a reverse run starts in the arbitrary reverse run.

[Operation]

When this signal is OFF, a reverse run starts from the block stop point.

When this signal is ON, a reverse run starts from the start point of the block where the movement stopped.

Return to the start point for the reverse run from block start, turn this signal ON, and then start an automatic operation.

Keep this signal ON until the "In auto operation "start"" signal (STL) turns ON.

This signal is available only in the reverse run control mode.

[Related signals]

(1) Macro interrupt priority (RVIT: YD09)
(2) Reverse run control mode (RVMD: YD0A)
(3) Reverse run (VRV: YC27)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MACRO INTERRUPT PRIORITY	RVIT	YD09	YE49	YF89	Y10C9	Y1209	Y1349	Y1489	Y15C9

[Function]

In the arbitrary reverse run, turning ON the "Macro interrupt" (UIT) signal executes a block stop during the reverse run. Then this signal is used to select the operation when an automatic operation is started while the "Reverse run" (VRV) signal is OFF.

[Operation]

When this signal is OFF, a forward run is executed with the fall of the "Automatic operation "start" command" signal.

When this signal is ON, a macro interrupt program is executed with the fall of the "Automatic operation "start" command" signal.

This signal is available only in the reverse run control mode.

[Related signals]

(1) Reverse run from block start (RVSP: YD08)
(2) Reverse run control mode (RVMD: YD0A)
(3) Reverse run (VRV: YC27)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	REVERSE RUN CONTROL MODE	RVMD	YD0A	YE4A	YF8A	Y10CA	Y120A	Y134A	Y148A	Y15CA

[Function]

This signal is used to save the reverse run information used for the reverse run control in the arbitrary reverse run.

[Operation]

When this signal is ON, the reverse run information is saved.

Turn this signal ON at the start of the block where the reverse run control is executed. Turn it OFF when resetting.

Turn ON the "Recalculation request" signal (CRQ) when turning ON this signal.

Unless the recalculation is requested, the reverse run information does not include the block that has been created by pre-reading.

[Related signals]

(1) Reverse run from block start (RVSP: YD08)
(2) Macro interrupt priority (RVIT: YD09)
(3) Reverse run (VRV: YC27)
(4) Recalculation request (CRQ: YC2B)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	RAPID TRAVERSE TIME CONSTANT : SWITCHOVER REQUEST	ACCG	YD0B	YE4B	YF8B	Y10CB	Y120B	Y134B	Y148B	Y15CB

[Function]

The rapid traverse time constant can be switched over.

1: Switch the rapid traverse time constant of all the axes of the part system to the axis specifications parameter "#2598 G0tL_2", and the rapid traverse time constant (primary delay) / second-step time constant for soft acceleration/ deceleration to the axis specifications parameter "#2599 G0t1_2".

0: Switch the rapid traverse time constant of all the axes of the part system back to the axis specifications parameter "#2004 G0tL", and the rapid traverse time constant (primary delay) / second-step time constant for soft acceleration/ deceleration back to the axis specifications parameter "#2005 G0tL".

[Operation]

When this signal turns ON(1), the NC will operate as follows:

- When any axis of the part system is moving in rapid traverse, the time constant will be switched after all the axes of the part system decelerate to a stop.
- When any axis of the part system is in cutting feed or at a standstill, the time constant will be switched immediately.

When this signal turns OFF(0), the NC will operate as follows:

- When any axis of the part system is moving in rapid traverse, the time constant will be switched back after all the axes of the part system decelerate to a stop.
- When any axis of the part system is in cutting feed or at a standstill, the time constant will be switched back immediately.

[Related signals]

(1) Rapid traverse time constant : In switchover (XD0B)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	3D manual feed (JOG,INC) in tool axis coordinate system	MJCT	YD18	YE58	YF98	Y10D8	Y1218	Y1358	Y1498	Y15D8
A	3D manual feed (JOG,INC) in table co-ordinate system	MJCB	YD19	YE59	YFB9	Y10D9	Y1219	Y1359	Y1499	Y15D9
A	3D manual feed (JOG,INC) in feature coordinate system	MJCF	YD1A	YE5A	YFBA	Y10DA	Y121A	Y135A	Y149A	Y15DA

[Function]

This signal is used to select the hypothetical coordinate system, in which the 3D manual feed is carried out.

It is possible to set different coordinate systems for each mode or handle.

[Operation]

This signal is used to select the coordinate system in which the 3D manual feed is carried out by jog feed or incremental feed.

[Related signals]

(1) Jog mode (J:YC00)

(2) Incremental mode (S:YC02)

(3) Tool center point rotation (TCPRC:YD27)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	3D manual feed (1st handle) in tool axis coordinate system	MH1CT	YD1B	YE5B	YFBB	Y10DB	Y121B	Y135B	Y149B	Y15DB
A	3D manual feed (1st handle) in table coordinate system	MH1CB	YD1C	YE5C	YFBC	Y10DC	Y121C	Y135C	Y149C	Y15DC
A	3D manual feed (1st handle) in feature coordinate system	MH1CF	YD1D	YE5D	YFBD	Y10DD	Y121D	Y135D	Y149D	Y15DD

[Function]

This signal is used to select the hypothetical coordinate system, in which the 3D manual feed is carried out.

It is possible to set different coordinate systems for each mode or handle.

[Operation]

This signal is used to select the coordinate system in which the 3D manual feed is carried out on the 1st handle axis.

[Related signals]

(1) 1st handle axis selection code (HS11 to HS116:YC40 to 4)

(2) 1st handle valid (HS1S:YC47)

(3) Tool center point rotation (TCPRC:YD27)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	3D manual feed (2nd handle) in tool axis coordinate system	MH2CT	YD1E	YE5E	YFBE	Y10DE	Y121E	Y135E	Y149E	Y15DE
A	3D manual feed (2nd handle) in table coordinate system	MH2CB	YD1F	YE5F	YFBF	Y10DF	Y121F	Y135F	Y149F	Y15DF
A	3D manual feed (2nd handle) in feature coordinate system	MH2CF	YD20	YE60	YFA0	Y10E0	Y1220	Y1360	Y14A0	Y15E0

[Function]

This signal is used to select the hypothetical coordinate system, in which the 3D manual feed is carried out.

It is possible to set different coordinate systems for each mode or handle.

[Operation]

This signal is used to select the coordinate system in which the 3D manual feed is carried out on the 2nd handle axis.

[Related signals]

(1) 2nd handle axis selection code (HS21 to HS216:YC48 to C)

(2) 2nd handle valid (HS2S:YC4F)

(3) Tool center point rotation (TCPRC:YD27)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	3D manual feed (3rd handle) in tool axis coordinate system	MH3CT	YD21	YE61	YFA1	Y10E1	Y1221	Y1361	Y14A1	Y15E1
A	3D manual feed (3rd handle) in table coordinate system	MH3CB	YD22	YE62	YFA2	Y10E2	Y1222	Y1362	Y14A2	Y15E2
A	3D manual feed (3rd handle) in feature coordinate system	MH3CF	YD23	YE63	YFA3	Y10E3	Y1223	Y1363	Y14A3	Y15E3

[Function]

This signal is used to select the hypothetical coordinate system, in which the 3D manual feed is carried out.

It is possible to set different coordinate systems for each mode or handle.

[Operation]

This signal is used to select the coordinate system in which the 3D manual feed is carried out on the 3rd handle axis.

[Related signals]

(1) 3rd handle axis selection code (HS31 to HS316:YC50 to 4)

(2) 3rd handle valid (HS3S:YC57)

(3) Tool center point rotation (TCPRC:YD27)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	Tool center point rotation	TCPRC	YD27	YE67	YFA7	Y10E7	Y1227	Y1367	Y14A7	Y15E7

[Function]

This signal informs the operation of the rotation axis of 3D manual feed (JOG/incremental/handle).

[Operation]

It operates with keeping the positional relationship of tool center point looking from the workpiece, when the rotation axis of 3D manual feed (JOG/incremental/handle) is operated.

Input					output	
#7912 NO_MANUAL	Hypothetical coordinate system selection signal			Tool center point rotation signal	Selection coordinate system	Tool center point rotary valid/invalid
	YD18	YD19	YD1A	YD27		
Valid	All 0			0	Machine coordinate system selection	Invalid
				1		Valid
	Only any one of them is 1			0	In accordance with the hypothetical coordinate system selection signal	Invalid
				1		Valid
	Other than above			0 / 1	The operation error "M01 3D manual feed/ Selecting coordinate system illegal 0231"	
Invalid	0/1	0/1	0/1	0 / 1	Machine coordinate system selection	Invalid

[Related signals]

(1) 3D manual feed (JOG, INC) in tool axis coordinate system
(2) 3D manual feed (JOG, INC) in table coordinate system
(3) 3D manual feed (JOG, INC) in feature coordinate system
(4) 3D manual feed (1st handle) in tool axis coordinate system
(5) 3D manual feed (1st handle) in table coordinate system
(6) 3D manual feed (1st handle) in feature coordinate system
(7) 3D manual feed (2nd handle) in tool axis coordinate system
(8) 3D manual feed (2nd handle) in table coordinate system
(9) 3D manual feed (2nd handle) in feature coordinate system
(10) 3D manual feed (3rd handle) in tool axis coordinate system
(11) 3D manual feed (3rd handle) in table coordinate system
(12) 3D manual feed (3rd handle) in feature coordinate system

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MISCELLANEOUS FUNCTION COMMAND HIGH-SPEED OUTPUT : M FUNCTION FINISH 1 to 4	MFIN 1 to 4	YD28 to B	YE68 to B	YFA8 to B	Y10E8 to B	Y1228 to B	Y1368 to B	Y14A8 to B	Y15E8 to B

[Function]

This status signal informs the controller that specified miscellaneous (M) function is accomplished on the PLC side when the high-speed method is selected for the miscellaneous command completion method.

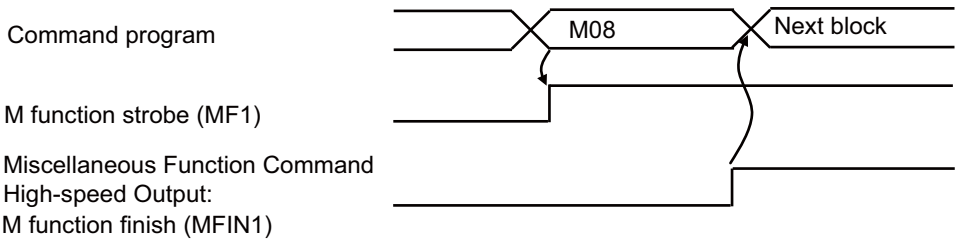
[Operation]

If the M function command is executed during automatic operation, the M function data will be output and the “M function strobe” signals (MF1 to 4) will be logically inverted.

When the PLC verifies that one or more M function has been specified, it performs that function(s) and, after completion of the function(s), those signals are logically inverted.

When the controller verifies that the “M function strobe” and the “High-speed M function finish” have become the same logic level, the M function is considered to be completed and the controller will proceed to the next block.

An example of timing chart, where M function is specified, is as follows:



(Note 1) At NC reset, those signals must be set to "0” because the “M function strobe” signals (MF 1 to 4) are also set to "0” at NC reset.

(Note 2) This signal is not used when the normal method (parameter "#1278 ext14/bit1"= "0").

[Related signals]

(1) M function strobe 1 to 4 (MF1 to 4: XC60)

(2) M, S, T, B function data (output to file register R: R504 and later)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MISCELLANEOUS FUNCTION COMMAND HIGH-SPEED OUTPUT: S FUNCTION FINISH 1 to 6	SFIN1 to 6	YD2C to F, YD38 to 9	YE6C to F, YE78 to 9	YFAC to F, YFB8 to 9	Y10EC to F, Y10F8 to 9	Y122C to F, Y1238 to 9	Y136C to F, Y1378 to 9	Y14AC to F, Y14B8 to 9	Y15EC to F, Y15F8 to 9

[Function]

This status signal informs the controller that specified spindle (S) function is accomplished on the PLC side when the high-speed method is selected for the miscellaneous command completion method.

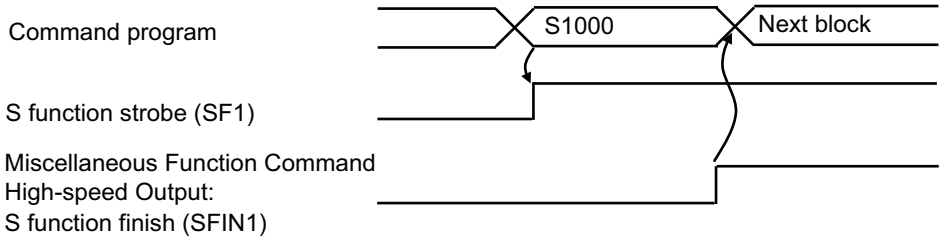
[Operation]

If the S function command is executed during automatic operation, the S function data will be output and the “S function strobe” signals (SF1 to 6) will be logically inverted.

When the PLC verifies that one or more S function has been specified, it performs that function(s) and, after completion of the function(s), those signals are logically inverted.

When the controller verifies that the “S function strobe” and the “High-speed S function finish” have become the same logic level, the S function is considered to be completed and the controller will proceed to the next block.

An example of timing chart, where S function is specified, is as follows:



(Note 1) At NC reset, those signals must be set to "0" because the “S function strobe” signals (SF 1 to 6) are also set to "0" at NC reset.

(Note 2) This signal is not used when the normal method (parameter "#1278 ext14/bit1"= "0").

[Related signals]

(1) S function strobe 1 to 6 (SF1 to 6: XC64)

(2) M, S, T, B function data (output to file register R: R504 and later)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MISCELLANEOUS FUNCTION COMMAND HIGH-SPEED OUTPUT : T FUNCTION FINISH 1 to 4	TFIN1 to 4	YD30 to 3	YE70 to 3	YFB0 to 3	Y10F0 to 3	Y1230 to 3	Y1370 to 3	Y14B0 to 3	Y15F0 to 3

[Function]

This status signal informs the controller that specified tool (T) function is accomplished on the PLC side when the high-speed method is selected for the miscellaneous command completion method.

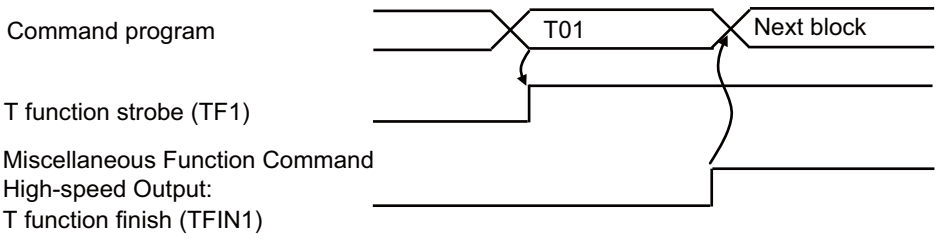
[Operation]

If the T function command is executed during automatic operation, the T function data will be output and the “T function strobe” signals (TF1 to 4) will be logically inverted.

When the PLC verifies that one or more T function has been specified, it performs that function(s) and, after completion of the function(s), those signals are logically inverted.

When the controller verifies that the “T function strobe” and the “High-speed T function finish” have become the same logic level, the T function is considered to be completed and the controller will proceed to the next block.

An example of timing chart, where T function is specified, is as follows:



(Note 1) At NC reset, those signals must be set to "0” because the “T function strobe” signals (TF 1 to 4) are also set to "0” at NC reset.

(Note 2) This signal is not used when the normal method (parameter "#1278 ext14/bit1"= "0").

[Related signals]

(1) T function strobe 1 to 4 (TF1 to 4: XC68)

(2) M, S, T, B function data (output to file register R: R504 and later)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MISCELLANEOUS FUNCTION COMMAND HIGH-SPEED OUTPUT : 2ND M FUNCTION FINISH 1 to 4	BFIN1 to 4	YD34 to 7	YE74 to 7	YFB4 to 7	Y10F4 to 7	Y1234 to 7	Y1374 to 7	Y14B4 to 7	Y15F4 to 7

[Function]

This status signal informs the controller that specified 2nd miscellaneous (B) function is accomplished on the PLC side when the high-speed method is selected for the miscellaneous command completion method.

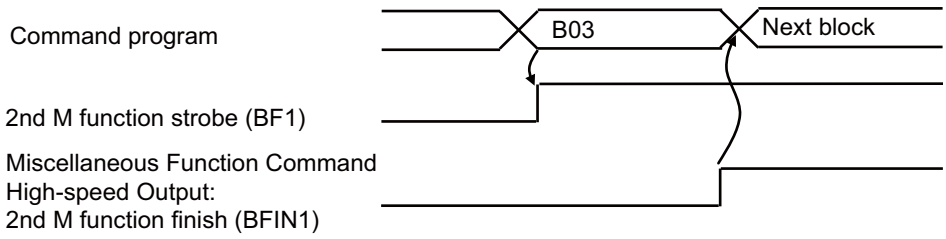
[Operation]

If the B function command is executed during automatic operation, the B function data will be output and the “2nd M function strobe” signals (BF1 to 4) will be logically inverted.

When the PLC verifies that one or more B function has been specified, it performs that function(s) and, after completion of the function(s), those signals are logically inverted.

When the controller verifies that the “2nd M function strobe” and the “High-speed 2nd M function finish” have become the same logic level, the B function is considered to be completed and the controller will proceed to the next block.

An example of timing chart, where 2nd miscellaneous (B) function is specified, is as follows:



(Note 1) At NC reset, those signals must be set to "0” because the “2nd M function strobe” signals (BF 1 to 4) are also set to "0” at NC reset.

(Note 2) This signal is not used when the normal method (parameter "#1278 ext14/bit1"= "0").

[Related signals]

(1) 2nd M function strobe 1 to 4 (BF1 to 4: XC6C)

(2) M, S, T, B function data (output to file register R: R504 and later)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	EDIT/SEARCH		Y1878

[Function]

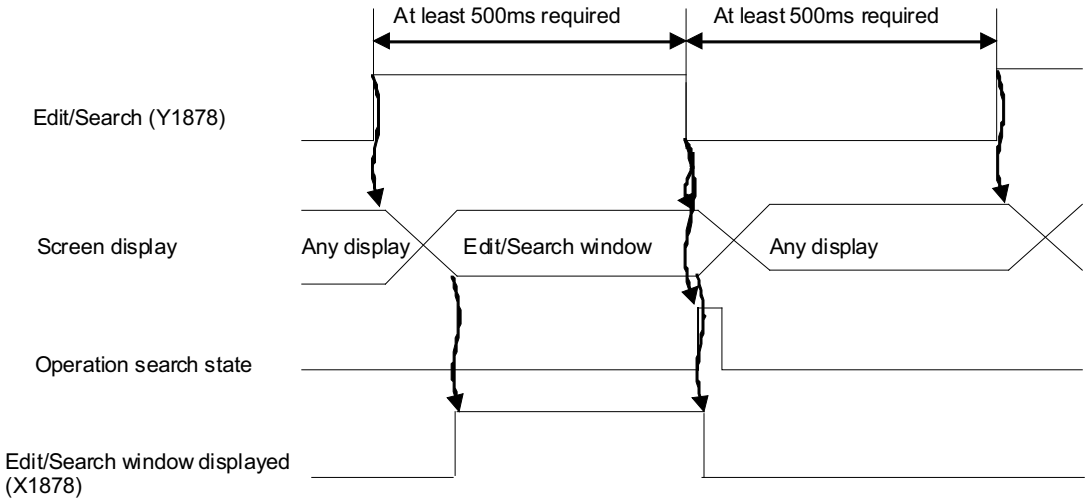
This signal indicates that the edit/search state has been entered.

[Operation]

Turning this signal ON identifies the edit/search state, displaying the Edit/Search window on the Monitor screen when the basic specification parameter "#11031 Cursor pos search" is set to "2". Moving the cursor at a position in the Edit/Search window and turning this signal OFF will start an operation search of the cursor position.

Allow at least 500ms between turning the "Edit/Search" signal ON and OFF.

[Timing chart]



[Related signals]

(1) Edit/Search window displayed (X1878)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	GEAR SHIFT COMPLETION	GFIN	Y1885	Y18E5	Y1945	Y19A5	Y1A05	Y1A65	Y1AC5	Y1B25

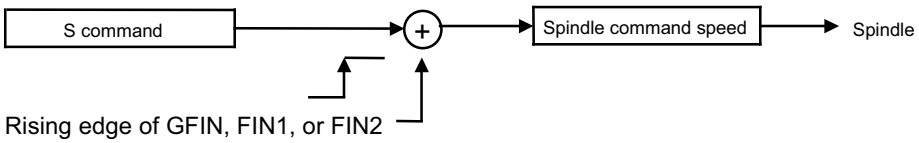
[Function]

This signal changes the spindle speed to the speed (S command) specified in the machining program.

This signal is used to smoothly perform the spindle speed (S command, etc.) control.

[Operation]

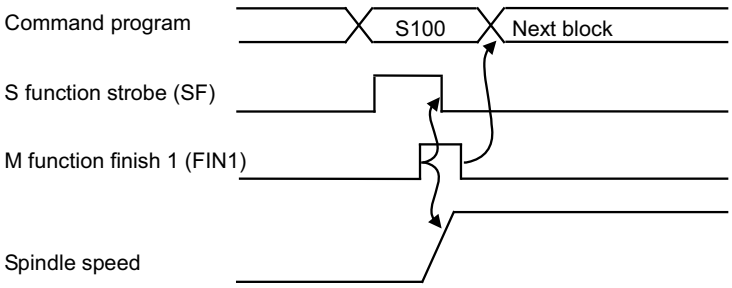
To change the spindle speed to the speed specified by the S command during automatic operation (memory, MDI, or tape), it is needed to turn ON the "Gear shift completion" (GFIN), or "M function finish 1 (FIN1, FIN2)" signal.



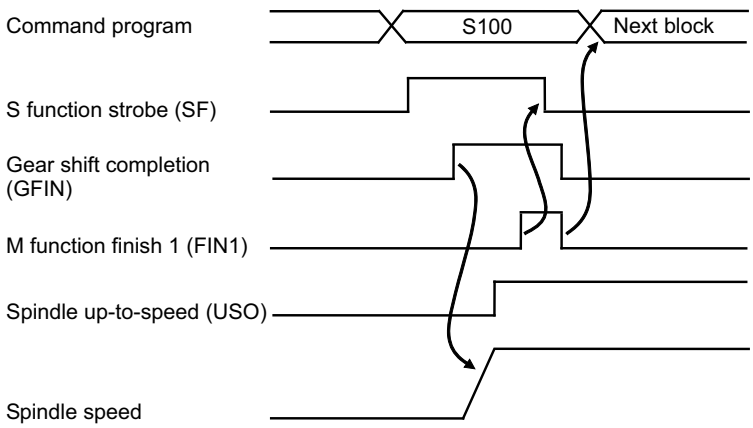
When using the "Gear shift completion" signal, the following two conditions should be considered:

- Whether gear shift (gear change) is applicable (whether there are two or more states of gear shift).
- Whether "Spindle up-to-speed" signal output from the spindle controller is used for verification of spindle speed.

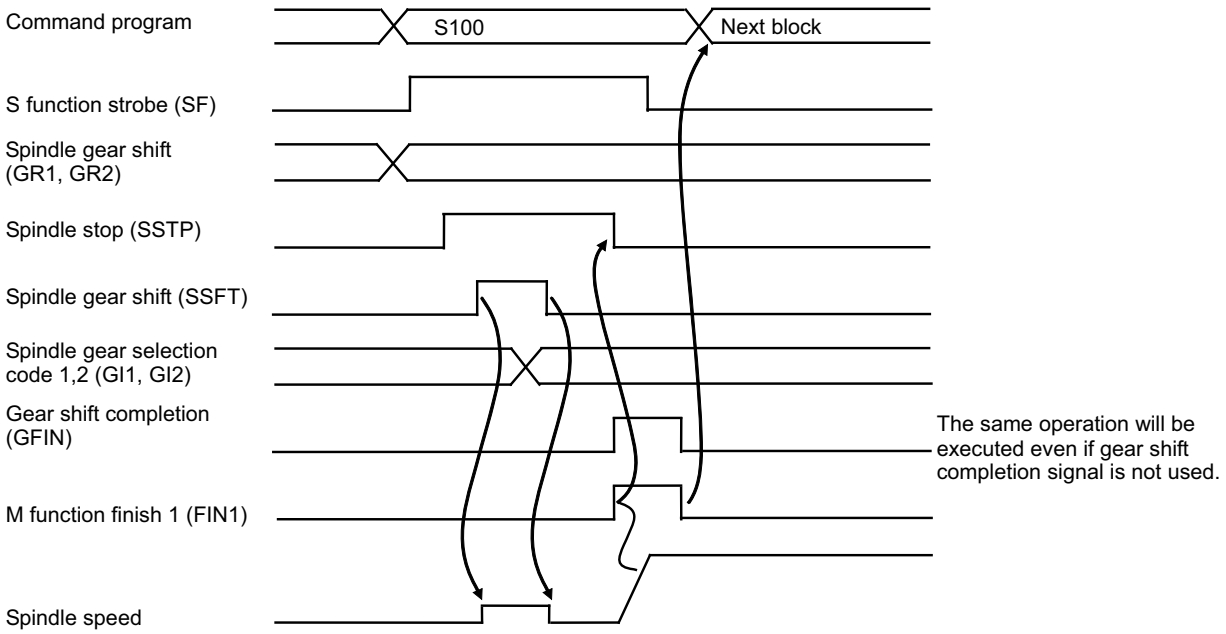
(Operation example 1) There is no gear shift and the "Spindle up-to-speed" signal is not used.



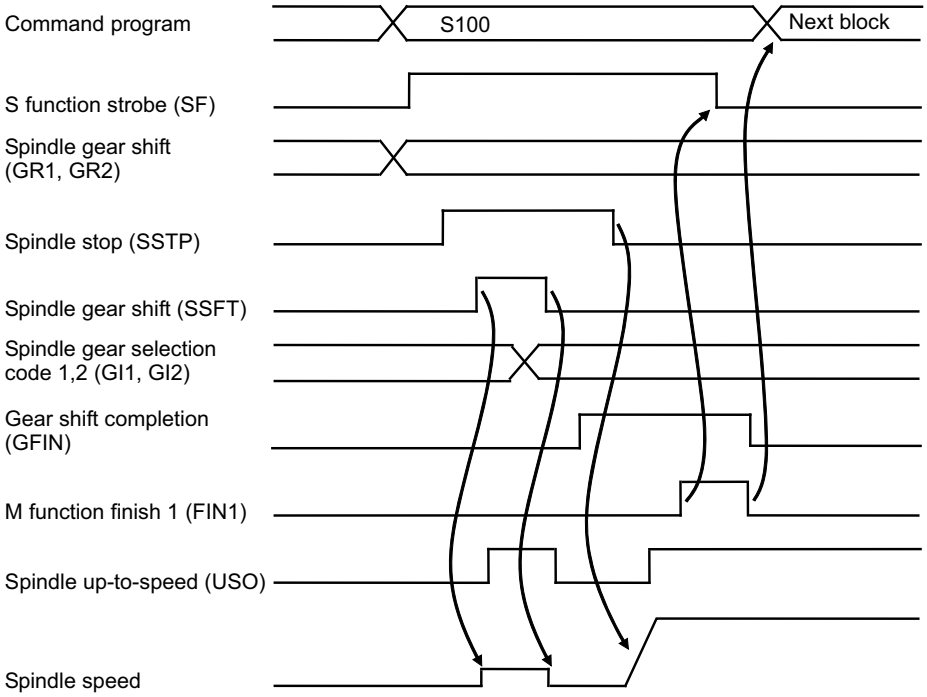
(Operation example 2) There is no gear shift, but the "Spindle up-to-speed" signal is used.



(Operation example 3) There is gear shift, but the "Spindle up-to-speed" signal is not used.


Command program
S100
Next block
S function strobe (SF)
Spindle gear shift (GR1, GR2)
Spindle stop (SSTP)
Spindle gear shift (SSFT)
Spindle gear selection code 1,2 (GI1, GI2)
Gear shift completion (GFIN)
M function finish 1 (FIN1)
Spindle speed
The same operation will be executed even if gear shift completion signal is not used.

(Operation example 4) There is gear shift and "Spindle up-to-speed" signal are used.



[Related signals]

(1) S function strobe (SFn: XC64)
(2) Spindle gear shift (GR1, GR2: X1885, X1886)
(3) M function finish (FIN1, FIN2: YC1E, YC1F)
(4) Spindle gear selection code 1,2 (GI1, GI2: Y1890, Y1891)
(5) Spindle stop (SSTP: Y1894), Spindle gear shift (SSFT: Y1895)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SPEED OVERRIDE CODE m	SP1 to 4	Y1888 to A	Y18E8 to A	Y1948 to A	Y19A8 to A	Y1A08 to A	Y1A68 to A	Y1AC8 to A	Y1B28 to A

[Function]

This signal applies override (multiplication) on the S command issued in the automatic operation (memory, MDI, tape).

[Operation]

When "Spindle override method selection" (SPS) signal is OFF, this signal is valid.

By selecting "Spindle speed override code m" (SP1 to 4) signal, override ratio can be selected within range from 50% to 120% (increment: 10%).

Override cannot be set when:

(1) "Spindle stop" signal is ON.

(2) TAP mode is selected.

(3) Thread cutting mode is selected.

This signal (SP1 to 4) is set with the code method. The relation is shown below.

SP4	SP2	SP1	Spindle override
1	1	1	50%
0	1	1	60%
0	1	0	70%
1	1	0	80%
1	0	0	90%
0	0	0	100%
0	0	1	110%
1	0	1	120%

[Related signals]

(1) Spindle override method selection (SPS: Y188F)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE OVERRIDE METHOD SELECTION	SPS	Y188F	Y18EF	Y194F	Y19AF	Y1A0F	Y1A6F	Y1ACF	Y1B2F

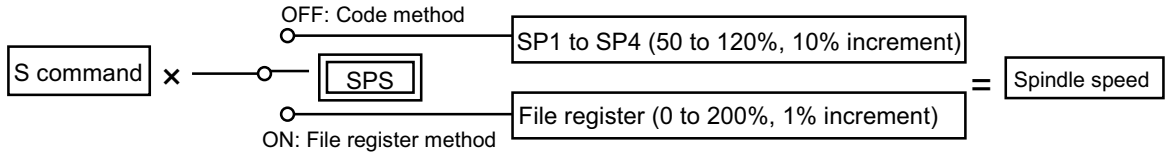
[Function]

When override is applied on the S command issued in automatic operation (memory, MDI or tape), "code method" or "file register method" is selected for override method.

[Operation]

When the "Spindle override method selection" (SPS) is OFF, code method override (signal SP1 to 4 is applicable) is selected.

When the "Spindle override method selection" (SPS) is ON, register method override (value set in file register is applicable) is selected.



(Note 1) For details of "code method override" and "file register method override", refer to the respective description.

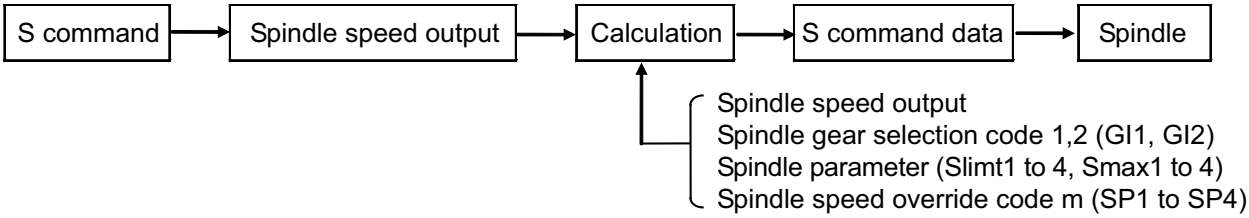
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE GEAR SELECTION CODE 1,2	GI1,2	Y1890,1	Y18F0,1	Y1950,1	Y19B0,1	Y1A10,1	Y1A70,1	Y1AD0,1	Y1B30,1

[Function]

This signal informs the controller which spindle gear has been selected on the machine side.

[Operation]

This signal is set according to the machine's spindle gear stage. The controller calculates the S command data (data is transferred when the spindle controller is the high-speed serial connection specification) based on this signal.
The flow after the S command is executed and output to the spindle is shown below.


S command
Spindle speed output
Calculation
S command data
Spindle
Spindle speed output
Spindle gear selection code 1,2 (GI1, GI2)
Spindle parameter (Slimt1 to 4, Smax1 to 4)
Spindle speed override code m (SP1 to SP4)

The relation of the gear stage, spindle gear selection code signal and spindle limit speed is as shown below.

Gear stage	Spindle gear selection code signal		Spindle speed limit
	GI2	GI1	
1	0	0	Slimt1
2	0	1	Slimt2
3	1	0	Slimt3
4	1	1	Slimt4

(1) Slimt1 to 4 are set with parameters. The spindle speed for when the S command data is the max. (the motor is run at the max. speed) is set.
This setting is used for each gear unit, and is determined by the deceleration ratio (gear ratio) of the motor and spindle.
For example, if the max. motor speed is 6000 r/min, and the 1st gear stage is decelerated to half, "3000" will be set in parameter Slimt1.

(2) The controller calculates the spindle speed output data as shown below.
For example, if S command is issued, gear selection input is the 2nd stage (GI1=ON, GI2=OFF), spindle override value (%) is SOVR, and S command data's max. value is "10":

$$\text{S command data} = \frac{\text{S command}}{\text{Slimt2}} \times \frac{\text{SOVR}}{100} \times 10$$

(3) If S1300 is executed when using S command output (max. 10V), Slimt2 = "2000", and spindle override "100%":

$$\text{S command output} = \frac{1300}{2000} \times \frac{100}{100} \times 10\ (\text{V}) = 6.5\ (\text{V})$$

(4) The S command is clamped with the Smaxn (n=1 to 4).
If Smax2="1000" in the above state, the S command output will be:

$$\text{S command output} = \frac{1000}{2000} \times \frac{100}{100} \times 10\ (\text{V}) = 5.0\ (\text{V})$$

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE HOLDING FORCE UP	EXOBS	Y1893	Y18F3	Y1953	Y19B3	Y1A13	Y1A73	Y1AD3	Y1B33

[Function]

This signal is used to validate the disturbance observer of the spindle drive unit to increase the spindle torque up.

[Operation]

(1) Confirm the spindle is stopped and turn this signal ON.
(2) Turning ON this signal validates the disturbance observer.
(3) When the spindle holding force gets high enough to execute the cutting, NC outputs the "In spindle holding force up" (EXOFN) signal.
(4) To cancel the spindle holding force up, confirm the spindle is stopped and then turn this signal OFF.

[Related signals]

(1) In spindle holding force up (EXOFN: X18B5)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE STOP	SSTP	Y1894	Y18F4	Y1954	Y19B4	Y1A14	Y1A74	Y1AD4	Y1B34

[Function]

In spindle control, S command data (spindle speed) can be set to "0" by using this signal (SSTP). Usually, the signal is not used alone, but combined with "Spindle gear shift" signal (SSFT) explained later.

[Operation]

When the signal (SSTP) is turned ON, S command data is set to "0". Analog data is restored when the signal is turned OFF.

When "Spindle gear shift" (SSFT) signal turns ON while the signal is ON, S command data which corresponds to speed set by the spindle speed parameter is output.

"Spindle speed override code m" (SP1 to 4) is ignored while the signal is ON.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE GEAR SHIFT	SSFT	Y1895	Y18F5	Y1955	Y19B5	Y1A15	Y1A75	Y1AD5	Y1B35

[Function]

This signal is used to run the spindle motor at low speed, when spindle gear is shifted, so that spindle gear can be engaged smoothly.

[Operation]

When the signal (SSFTn) turns ON, the S command data equivalent to the low speed previously set by parameter is output.

If gears are not engaged properly, the signal is turned ON. It should be noted that "Spindle stop" (SSTPn) signal should be ON beforehand to use the signal (SSFTn).

Together with this signal (SSFTn), the forward run signal or the reverse run signal needs to be turned ON.

Spindle gear shift speed is selected by "Spindle gear selection code m" (GImn).The relation is as follows:

Gearstage	Spindle gearselection codesignal		Spindle speed atgear shift	Spindle speedlimit
	GI2n	GI1n		
1	0	0	Ssift1	Slimt1
2	0	1	Ssift2	Slimt2
3	1	0	Ssift3	Slimt3
4	1	1	Ssift4	Slimt4

S command data (spindle speed data) while "Spindle gear shift" (SSFTn) signal is ON can be determined from the formula shown below.

For example, if the "Spindle gear selection code m" (GImn) is the 1st stage (GI1n=OFF, GI2n=OFF), the spindle rotation speed data is as follows:

$$\text{Spindle rotation speed (Motor rotation speed)} = \frac{\text{Ssift1}}{\text{Slimt1}} \times \text{Maximum motor rotation speed}$$

Actual value is as follows:

Spindle command final data (SBINn) = Ssift1 / Slimt1 * 4095

When the spindle command final data (SBINn) is "4095", the rotation speed of the motor becomes maximum.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE ORIENTATION	SORC	Y1896	Y18F6	Y1956	Y19B6	Y1A16	Y1A76	Y1AD6	Y1B36

[Function]

This signal is used to run the spindle motor at low speed when executing mechanical orientation (Note) during spindle control.

<Supplement>

Since most spindle drive/control units recently marketed are equipped with spindle orientation function, and therefore this signal is rarely used for mechanical orientation. The signal (SORCn) is used for application such as rotating the spindle by constant rotation speed.

(Note) The mechanical orientation assumes to operate the orientation by performing as follows.

(1) Rotate the spindle at low speed.

(2) It detects when the spindle has reached the area where such as proximity switch is used and then stops the spindle. The spindle stops after the speed is slowed to some extent.

(3) The position (the orientation position) is decided by hitting the pin against the spindle under the status of (2).

[Operation]

When the signal (SORCn) turns ON, spindle speed is changed to the low speed previously set by parameter.
It should be noted that "Spindle stop" (SSTPn) signal must be ON to use the signal (SORCn). Together with this signal (SORCn), the forward run signal or the reverse run signal is required.

The table below shows the relationship between the oriented spindle speed and the "Spindle gear selection code m" (GImn) signal.

Gearstage	Spindle gearselection codesignal		Orientantion spindle speed	Spindle speedlimit
	GI2n	GI1n		
1	0	0	SORI	Slimt1
2	0	1		Slimt2
3	1	0		Slimt3
4	1	1		Slimt4

Spindle speed data while "Spindle orientation" (SORCn) signal is ON can be determined from the formula shown below. When "Spindle gear selection code m" (GImn)" signal combination is GI2n=0 and GI1n=1, the spindle rotation speed data is as follows:

$$\text{Orientation spindle speed data (Motor rotation speed)} = \frac{\text{SORI}}{\text{Slimt2}} \times \text{Maximum motor rotation speed}$$

Actual spindle rotation speed is as follows:

Spindle command final data (SBINn) = SORI / Slimt2 * 4095

When the spindle command final data (SBINn) is "4095", the motor becomes the maximum rotation speed.

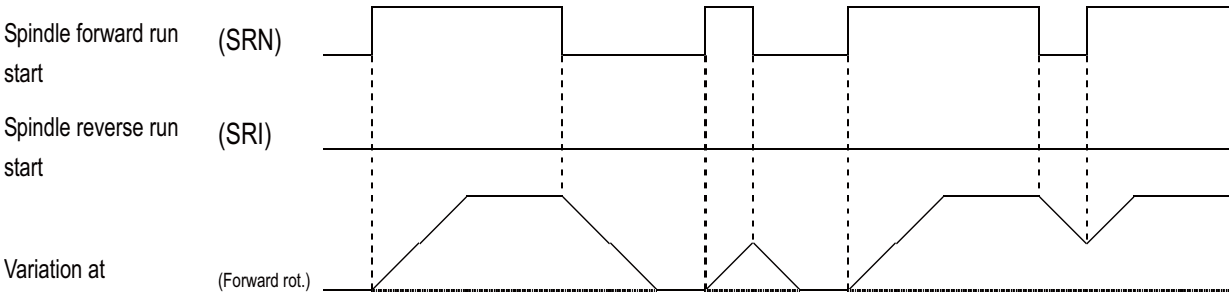
Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE FORWARD RUN START	SRN	Y1898	Y18F8	Y1958	Y19B8	Y1A18	Y1A78	Y1AD8	Y1B38

[Function]

This signal is issued to the high speed serial connection specification spindle controller (spindle drive). When the signal turns ON, the spindle motor starts rotating in normal direction (CCW as viewed from the shaft side).

[Operation]

Spindle starts running at speed specified by S command (S command data) when the signal (SRN) is turned ON.
When the signal is turned OFF, spindle motion decelerates and stops.
When the "Spindle forward run start" signal (SRN) is turned OFF during acceleration of spindle forward rotation, the acceleration will be interrupted and the spindle will decelerate to stop immediately.
When the "Spindle forward run start" signal (SRN) is turned OFF during deceleration to stop of spindle forward rotation, the spindle deceleration will be interrupted and the acceleration will start immediately.



(1) Spindle decelerates to stop if "Spindle forward run start" signal (SRN) and "Spindle reverse run start" signal (SRI) are turned ON at the same time. To resume forward run, both signals OFF once and then turn the "Spindle forward run start" signal ON.
(2) The operation may stop during forward run due to emergency stop, spindle alarm or resetting. Turn the forward run signal OFF and ON once after the "Servo ready completion" signal (SA) turns ON.
(3) The motor will not run if the S command data is 0. The motor will run at the corresponding rotation speed when the S command data changes.
(4) When "Spindle orientation command" signal (ORC) is turned ON at the same as "Spindle forward run start" signal (SRN) is turned ON, priority is given to the former signal.
(5) Servo ON command (SRV) of the spindle control input signal has to controlled at the NC side so that it will turn ON when starting the spindle rotation and OFF when decelerating to stop.

[Related signals]

(1) Spindle reverse run start (SRI: Y1899)
(2) Spindle orientation command (ORC: Y189E)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE REVERSE RUN START	SRI	Y1899	Y18F9	Y1959	Y19B9	Y1A19	Y1A79	Y1AD9	Y1B39

[Function]

This signal is issued to the high speed serial connection specification spindle controller (spindle drive). When the signal turns ON, the spindle motor starts rotating in inverse direction (CW as viewed from the shaft side).

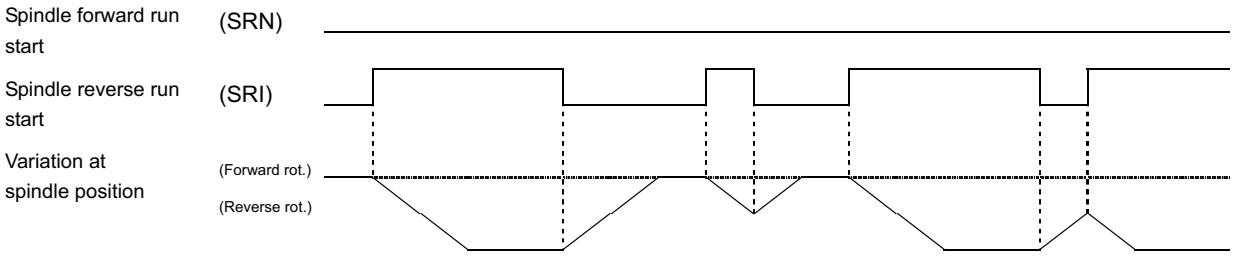
[Operation]

Spindle starts running at speed specified by S command (S command data) when the signal (SRI) is turned ON. (The operation with "Spindle reverse run start" (SRI) signal is the same as one with "Spindle forward run start" (SRN) except for its rotation direction.)

When the signal is turned OFF, spindle motion decelerates and stops.

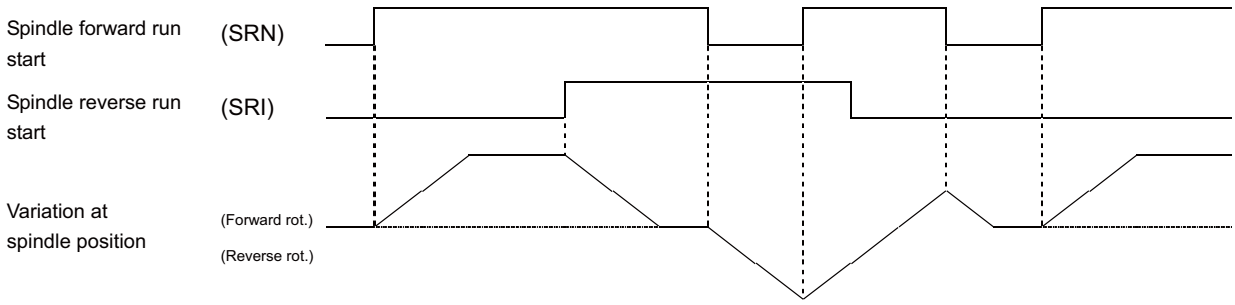
When the "Spindle reverse run" signal (SRI) is turned OFF during acceleration of spindle reverse rotation, the acceleration will be interrupted and the spindle will decelerate to stop immediately.

When the "Spindle reverse run" signal (SRI) is turned OFF during deceleration to stop of spindle reverse rotation, the spindle deceleration will be interrupted and the acceleration will start immediately.



(1) Spindle decelerates to stop if "Spindle reverse run start" signal (SRI) and "Spindle forward run start" signal (SRN) turn ON at the same time. To resume reverse run, both signals OFF once and then turn the "Spindle reverse run start" signal ON.

(2) The operation may stop during reverse run due to emergency stop, spindle alarm or resetting. Turn the reverse run signal OFF and ON once after the "Servo ready completion" signal (SA) turns ON.



(3) The motor will not run if the S command data is 0. The motor will run at the corresponding rotation speed when the S command data changes.

(4) When "Spindle orientation command" signal (ORC) is turned ON at the same time "Spindle reverse run start" signal (SRI) is turned ON, priority is given to the former signal.

(5) Servo ON command (SRV) of the spindle control input signal has to controlled at the NC side so that it will turn ON when starting the spindle rotation and OFF when decelerating to stop.

[Related signals]

(1) Spindle forward run start (SRN: Y1898)

(2) Spindle orientation command (ORC: Y189E)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE TORQUE LIMIT 1	TL1	Y189A	Y18FA	Y195A	Y19BA	Y1A1A	Y1A7A	Y1ADA	Y1B3A
A	SPINDLE TORQUE LIMIT 2	TL2	Y189B	Y18FB	Y195B	Y19BB	Y1A1B	Y1A7B	Y1ADB	Y1B3B

[Function]

This signal is issued to the high-speed serial connection specification spindle controller (spindle drive). When the signal turns ON, spindle motor torque is reduced temporarily.

The signal is used in mechanical oriented spindle stop, or gear shift.

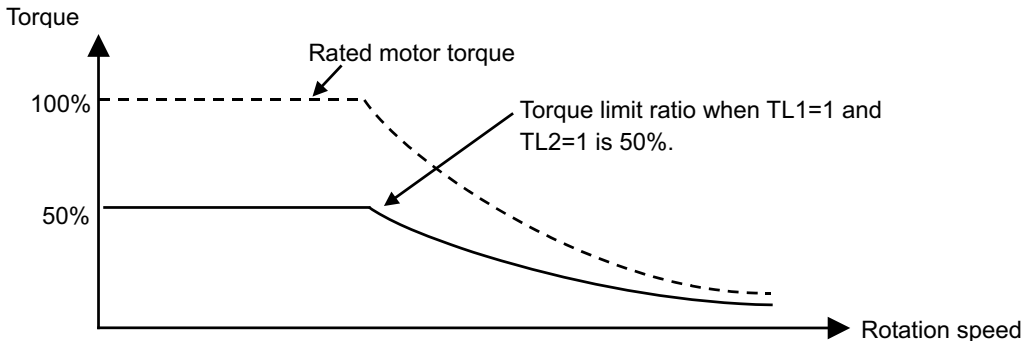
[Operation]

There are spindle torque limit 1 (TL1) and spindle torque limit 2 (TL2) signals.

Torque limit ratio is determined depending on the combination of spindle torque limit 1 (TL1) and 2 (TL2), and the output torque will drop accordingly.

Signal Selection		Spindle torque limit (TL1)	Spindle torque limit (TL2)	Note
Torque limit invalid		0	0	
Torque limit	001	1	0	Limits with value of the spindle parameter SP065
	002	0	1	Limits with value of the spindle parameter SP066
	003	1	1	Limits with value of the spindle parameter SP067

(Example) When TL1=1,TL2=1 and SP067=50



(Note 1) This signal is valid only for systems that are connected with the spindle controller via high-speed serial interface.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE FORWARD RUN INDEX	WRN	Y189C	Y18FC	Y195C	Y19BC	Y1A1C	Y1A7C	Y1ADC	Y1B3C

[Function]

This signal is used for the spindle forward run index in multi-point indexing.

[Operation]

(1) Multi-point indexing

(a) This signal turns ON after the "Spindle in-position (ORAO)" signal is output.

(b) Continuous indexing can be carried out by turning this signal ON and OFF while the "Spindle orientation command" (ORC) signal is ON.

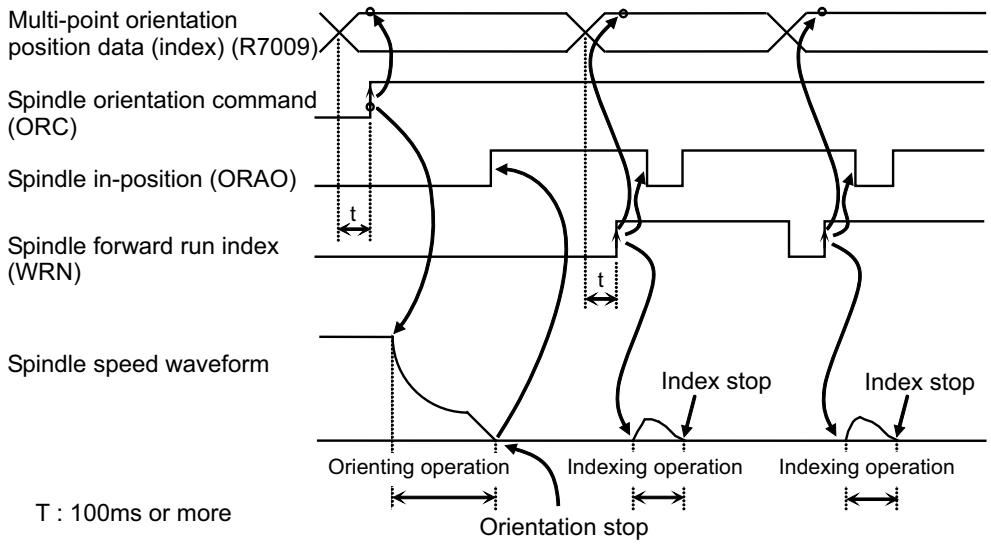
(c) If this signal is turned ON before the "Spindle orientation command" (ORC) signal is turned ON and the "Spindle in-position" (ORAO) signal is output, first the "Spindle orientation command" (ORC) signal will turn ON, and the orientation will be completed at the multi-point orientation position data (R7009) read in. Then, the spindle will be indexed to the position command value read in when this signal is turned ON. If the position command value is the same when the "Spindle orientation command" (ORC) turns ON and this signal turns ON, the indexing operation will not be carried out.

(d) The index position command value is read in at the rising edge of this signal. Thus, even if the index position command value is changed after this signal is input, the stop position will not change.

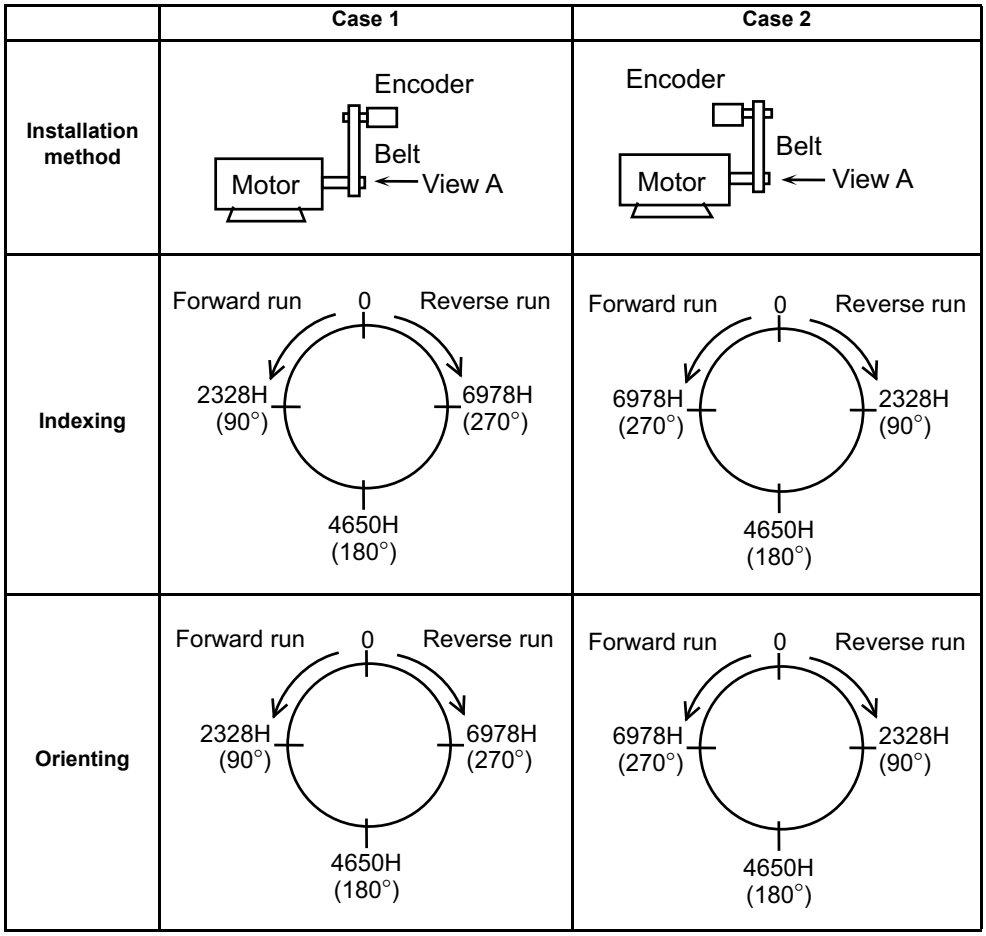
(e) Even if this signal is turned OFF while the "Spindle orientation command" (ORC) is ON, the spindle will continue to stop at the position before this signal was turned OFF. Even if this signal is turned OFF during the indexing operation, the spindle will stop at the position command value read at the rising edge of this signal.

(f) If the stop point and index position command value are close (within the in-position range), the "Spindle in-position" (ORAO) signal may not turn OFF and the indexing may be carried out.

(g) If the "Spindle orientation command" (ORC) signal is turned OFF during indexing or when stopped, the servo lock will turn OFF and the motor will coast. Orientation must be carried out again when executing indexing again.



[Indexing operation according to encoder installation direction]



(Note) Case 1 above applies when using the motor built-in encoder with Z-phase.

[Related signals]

(1) Multi-point orientation position data (R7009)

(2) Spindle in-position (ORAO: X188E)

(3) Spindle orientation command (ORC: Y189E)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE REVERSE RUN INDEX	WRI	Y189D	Y18FD	Y195D	Y19BD	Y1A1D	Y1A7D	Y1ADD	Y1B3D

[Function]

This signal is used for the spindle reverse run index in multi-point indexing.

[Operation]

The operation is the same as forward run indexing, except that the direction is different. Refer to the section on "Spindle forward run index".

[Related signals]

(1) Spindle forward run index (WRN: Y189C)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE ORIENTATION COMMAND	ORC	Y189E	Y18FE	Y195E	Y19BE	Y1A1E	Y1A7E	Y1ADE	Y1B3E

[Function]

This signal is issued to the high-speed serial connection specification spindle controller (spindle drive). When the signal is turned ON, the spindle is indexed in position.

[Operation]

If the "Spindle orientation command" signal (ORC) turns ON during spindle rotation or when stopped, the spindle will start orientation (stopping at set position). When positioning at the set position is completed, the "Spindle in-position" signal (ORAO) will be output, and orientation will stop.

During oriented spindle stop, the control system is under "servo lock" condition. Servo lock is released when the signal (ORC) is turned OFF. When servo lock must be maintained, the signal, therefore, should be kept turned ON.

The encoder or magnetic sensor method can be used for orientation.

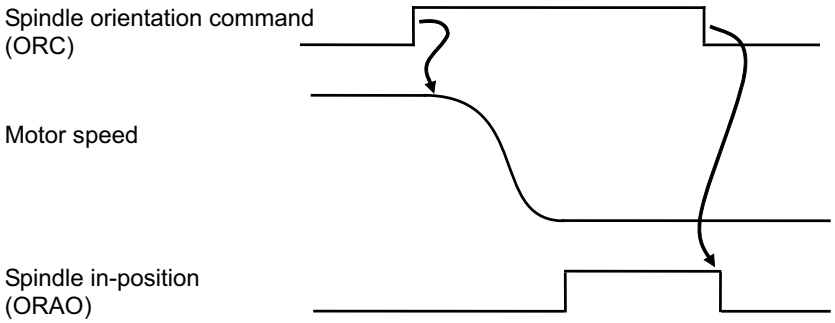
The orientation rotation direction is determined with the parameters.

The orientation stop position is determined by the Z-phase for the encoder method, and by the sensor installation position for the magnetic sensor method. The stopping position can be changed with the following items when using the encoder method.

(1) By parameters (position shift amount)

(2) By multi-point orientation position data (data specification by R7009) value
The multi-point orientation position data by the parameter and R7009 is added.

The timing chart for basic orientation is shown below.



(Note 1) The "Spindle orientation command" (ORC) takes precedence over the forward run (SRN) and reverse run (SRI) commands.

(Note 2) This signal is valid only for systems that are high-speed serial connected with the spindle controller.

[Related signals]

(1) Multi-point orientation position data (R7009)

(2) Spindle in-position (ORAO: X188E)

(3) Spindle 2nd in-position (ORA2O:X1888)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	L COIL SELECTION	LRSL	Y189F	Y18FF	Y195F	Y19BF	Y1A1F	Y1A7F	Y1ADF	Y1B3F

[Function]

This signal is used to select the low-speed coil in the spindle coil changeover function.

[Operation]

The high-speed coil and low-speed coil are changed over only with the "L coil selection" (LRSL) in the 2-step coil changeover specification. The high-speed coil, middle- speed coil and low-speed coil are changed over with the combination of the "L coil selection" (LRSL) and "M coil selection" (LRSM) in the 3-step coil changeover specification.

(Note) The coil is not changed over during the position loop control mode even if this signal is changed.
The coil selected immediately before the position loop control mode is entered is retained.

(1) 2-step coil changeover

Selected coil	L coil selection (LRSL)	In L coil selection (LCSA)
High-speed (H)	OFF	OFF
Low-speed (L)	ON	ON

(2) 3-step coil changeover

Selected coil	L coil selection (LRSL)	M coil selection (LRSM)	In L coil selection (LCSA)	In M coil selection (MCSA)
High-speed (H)	OFF	OFF	OFF	OFF
Middle-speed (M)	OFF	ON	OFF	ON
Low-speed (L)	ON	OFF	ON	OFF
	ON	ON	ON	ON

[Related signals]

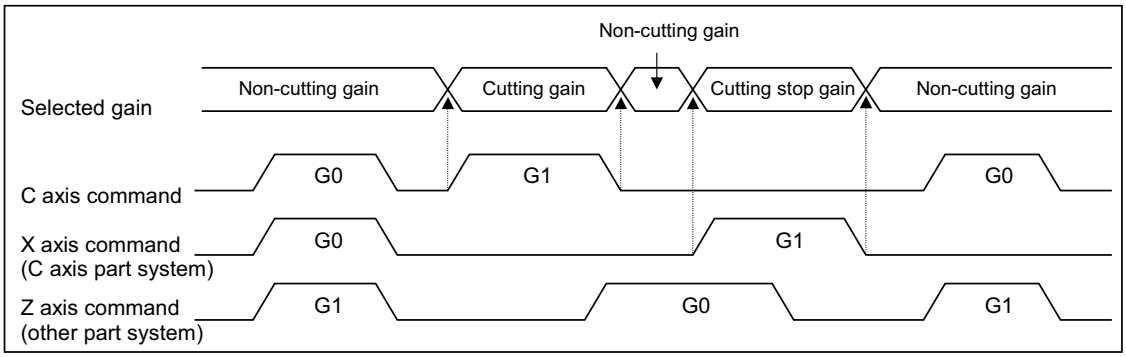
(1) M coil selection (LRSM: Y18A6)
(2) In L coil selection (LCSA: X188F)
(3) In M coil selection (MCSA: X189E)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE POSITION CONTROL (C AXIS) CUTTING GAIN L,H		Y18A2,3	Y1902,3	Y1962,3	Y19C2,3	Y1A22,3	Y1A82,3	Y1AE2,3	Y1B42,3

[Function]

This signal selects whether to change the C axis gain (select optimum gain) according the C axis cutting state. During C axis cutting feed, cutting gain is applied. During other axis' cutting feed (C axis face turning), non-cutting stop gain is applied. Non-cutting gain is applied in all other cases.

[Operation]



(Note 1) The cutting feed of other part systems dose not affect the C axis gain selection.

(Note 2) There are 1st to 3rd cutting gains, which are selected with the ladder.

Signal Selected details	C axis gain L	C axis gain H	Remarks	
Non-cutting gain	-	-	Spindle parameter SP003 selection	Selected during rapid traverse
1st cutting gain	0	0	Spindle parameter SP130 selection	Selected during cutting feed
	1	1		
2nd cutting gain	1	0	Spindle parameter SP131 selection	
3rd cutting gain	0	1	Spindle parameter SP132 selection	
Cutting stop gain	-	-	Spindle parameter SP133 selection	

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE POSITION CONTROL (SPINDLE/C AXIS CONTROL): C AXIS SELECTION	CMOD	Y18A5	Y1905	Y1965	Y19C5	Y1A25	Y1A85	Y1AE5	Y1B45

[Function]

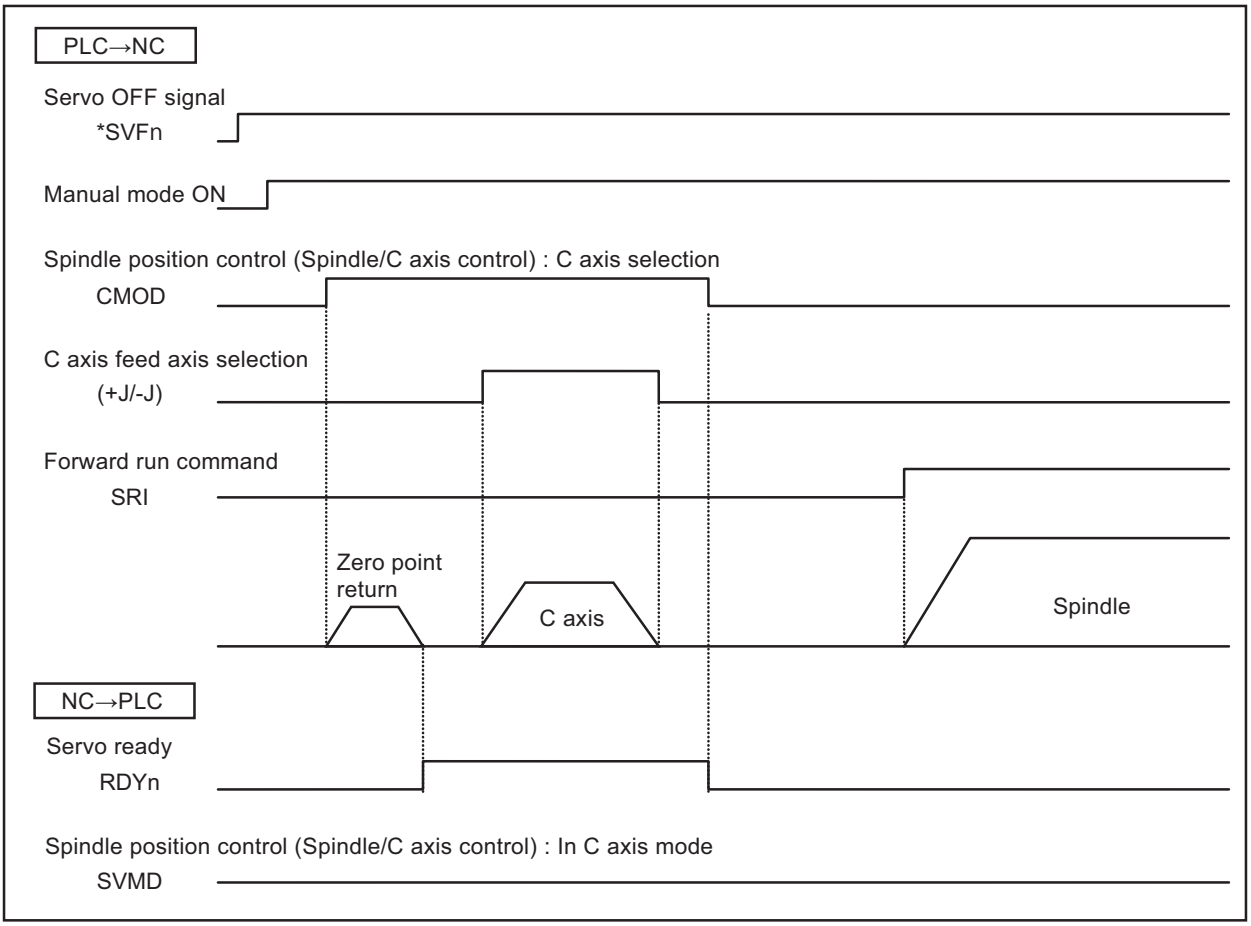
When the program command method ("#3129 cax_spec" /bit0 = "1") is selected for the spindle in position control, this signal can be used to switch between the C axis mode and spindle mode during manual operation.

[Operation]

The C axis mode is entered when this C axis selection signal turns ON, and the spindle mode is entered when this signal turns OFF.

(Note 1) This signal is valid only when the program command method is selected for spindle position control.

(Note 2) The "Spindle position control (Spindle/C axis control): C axis mode ON" signal (SVMD), which gives the mode information during spindle position control in the program command method, does not notified when switching is performed by selecting the C axis.



Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	M COIL SELECTION	LRSM	Y18A6	Y1906	Y1966	Y19C6	Y1A26	Y1A86	Y1AE6	Y1B46

[Function]

This signal is used to select the middle-speed coil in the 3-step coil changeover specification of the spindle coil changeover function.

[Operation]

The coil is selected depending on the combination of this signal and the "L coil selection" (LRSL).

(Note) The coil is not changed over during the position loop control mode even if this signal is changed. The coil selected immediately before the position loop control mode is entered is retained.

Selected coil	L coil selection (LRSL)	M coil selection (LRSM)	In L coil selection (LCSA)	In M coil selection (MCSA)
High-speed (H)	OFF	OFF	OFF	OFF
Middle-speed (M)	OFF	ON	OFF	ON
Low-speed (L)	ON	OFF	ON	OFF
	ON	ON	ON	ON

[Related signals]

(1) L coil selection (LRSL: Y189F)
(2) In L coil selection (LCSA: X188F)
(3) In M coil selection (MCSA: X189E)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SELECTION	SWS	Y18A8	Y1908	Y1968	Y19C8	Y1A28	Y1A88	Y1AE8	Y1B48

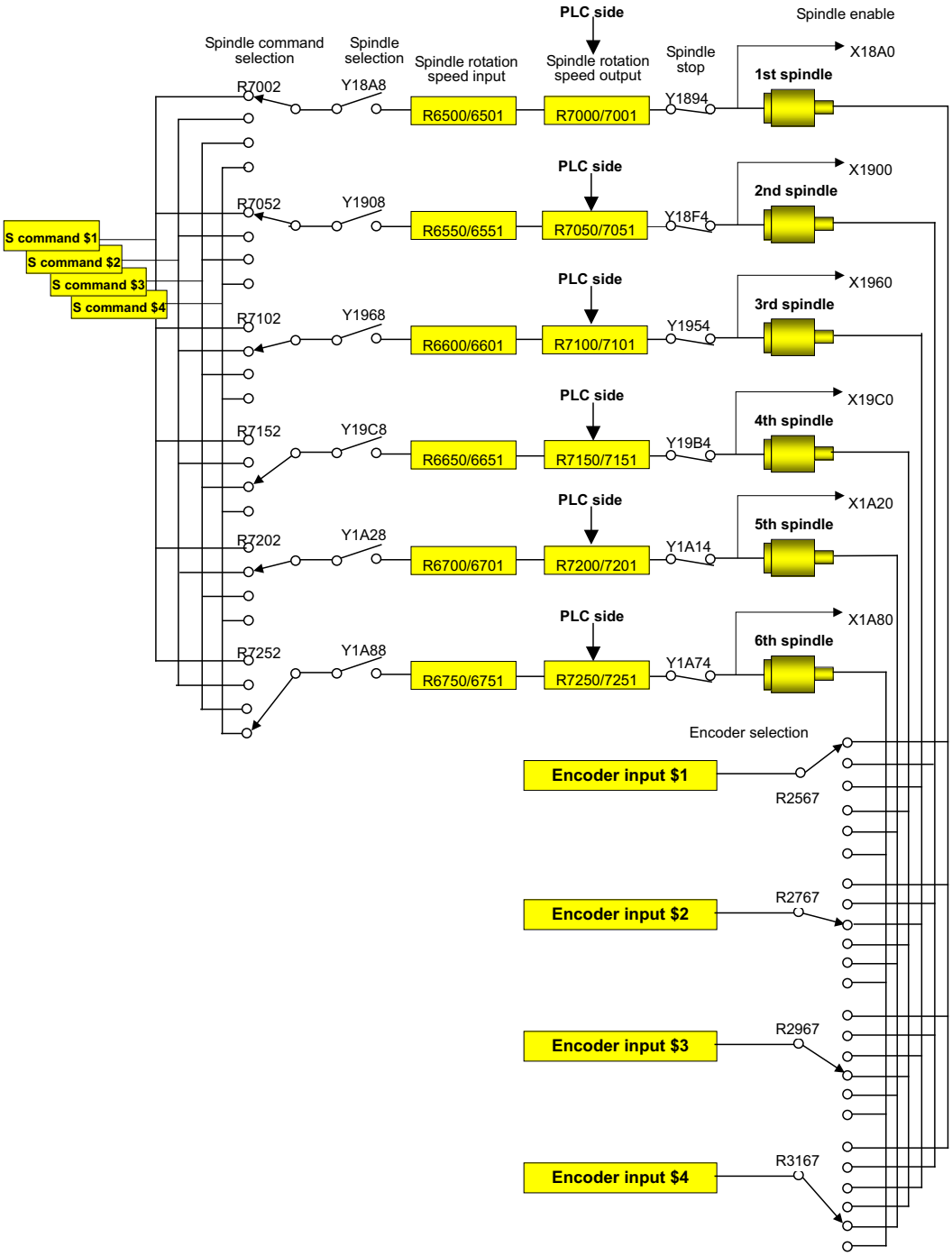
[Function]

The spindle to which the S command for the spindle is output is selected when the multi-spindle control II is valid.

0: Not select

1: Select

[Operation]



If an S command is given while the spindle selection (SWS) and spindle command selection (SLSP) have already been input through different blocks, this S command is handled as a rotation speed command of the selected spindle. The selected spindle rotates at the rotation speed which was output. The spindles which were deselected by the "Spindle selection" signal (SWS) OFF continue to rotate at the same rotation speed as the speed immediately before their de-selection. This allows each spindle to be rotated simultaneously at a different rotation speed. The "Spindle command selection" signal is used to select which of the spindles is to receive the S command from which part system.

[Caution]

If the spindle selection (SWS) or spindle command selection (SLSP) is executed through an M code given in the same block as an S code, the spindle selection (spindle rotation speed) will not be updated.

[Related signals]

(1) Spindle command selection (SLSP: R7002)
(2) Spindle stop (SSTP: Y1894)
(3) Spindle enable (ENB: X18A0)
(4) Encoder selection (R2567)
(5) Spindle forward run start (SRN: Y1898)
(6) Spindle reverse run start (SRI: Y1899)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Spindle rotation reversal	SPRR	Y18AA	Y190A	Y196A	Y19CA	Y1A2A	Y1A8A	Y1AEA	Y1B4A

[Function]

The signal is intended for a spindle controller (spindle drive). The signal is able to reverse the spindle rotation signal (Spindle forward run start (SRN: Y1898) and Spindle reverse run start (SRI: Y1899)).

This signal is valid only when the spindle rotation direction switch method selection (SPRS:Y18AB) is ON.

[Operation]

Turning ON the SPRR signal reverses the direction of the spindle rotation command.

Rotation signal	Spindle rotation reversal(SPRR:Y18AA)	Motor rotation direction
Spindle forward run start (SRN:Y1898)	OFF	Foward rotation
	ON	Reverse rotation
Spindle reverse run start (SRI:Y1899)	OFF	Reverse rotation
	ON	Foward rotation

This signal is also valid for the following functions.

(1) Synchronous tapping cycle command
The signal reverses the rotation direction of the tapping spindle motor.
(2) Spindle synchronization
The signal reverses the rotation direction of the reference and synchronized spindles.
(3) Tool spindle synchronization I A (Spindle-Spindle, Polygon)
The signal reverses the rotation direction of the reference and synchronized spindles.
(4) Tool spindle synchronization I B (Spindle-Spindle, Polygon)
The signal reverses the rotation direction of the workpiece and rotary tool spindles.
(5) Tool spindle synchronization II (hob machining)
The signal reverses the rotation direction of the reference spindle.
(6) Spindle superimposition control
The signal reverses the rotation direction of the reference and superimposed spindles.

(Note 1) While the above functions are being executed, a change of this signal is disabled for the target spindle. Thus, change this signal before executing the program command of each function.
If none of the above functions are executed, this signal is enabled immediately upon input.
(Note 2) This signal is disabled for the following operations: zero point return in the C axis mode of spindle/C axis control, C axis mode of spindle/C axis control, spindle orientation, spindle forward run indexing, spindle reverse run indexing and turret indexing.

(1) Synchronous tapping cycle command
Turning ON the spindle rotation reversal signal (SPRR:Y18AA) reverses the spindle rotation direction at the synchronous tapping cycle command.
The SPRR signal is enabled for the tapping spindle specified in the synchronous tapping cycle command.
As listed below, the direction of the tapping spindle varies according to the combination of the SPRR signal and "#3052 spplr (spindle motor spindle relative polarity)".

Forward tapping command (when a synchronous tapping command is given with the unsigned D (tapping spindle No.))

Spindle rotation reversal (SPRR:Y18AA)	spplr	Spindle motor rotation in the cutting	Spindle motor rotation in the returning
OFF	0	Foward rotation	Reverse rotation
	1	Reverse rotation	Foward rotation
ON	0	Reverse rotation	Foward rotation
	1	Foward rotation	Reverse rotation

Reverse tapping command (when a synchronous tapping command is given with the minus D (tapping spindle No.))

Spindle rotation reversal (SPRR:Y18AA)	spplr	Spindle motor rotation in the cutting	Spindle motor rotation in the returning
OFF	0	Reverse rotation	Foward rotation
	1	Foward rotation	Reverse rotation
ON	0	Foward rotation	Reverse rotation
	1	Reverse rotation	Foward rotation

(Note 1) Turn ON the spindle rotation reversal signal for the tapping signal before the synchronous tapping cycle command.
If you change the spindle rotation reversal signal From On to OFF or from OFF to ON during the synchronous tapping cycle, the spindle motor rotation direction is unchanged.

(2) Spindle synchronization control command

Turning ON the spindle rotation reversal signal (SPRR: Y18AA) reverses the rotation direction of the reference and synchronized spindle motors at the spindle synchronization control command.

When the SPRR signal is ON for the reference spindle, the reference spindle motor rotates in the direction opposite to the spindle rotation signal (spindle forward run start (SRN:Y1898) or spindle reverse run start (SRI:Y1899)). However, the synchronized spindle motor remains in the same rotation direction as when the SPRR signal is OFF for the reference spindle.

When the SPRR signal is ON for the synchronized spindle, the rotation direction of the synchronized spindle motor is reversed.

<Motion example>

Listed below are the state of the SPRR signal and the rotation direction of the reference and synchronized spindle motors when you execute a spindle synchronous control command that rotates the reference and synchronized spindles in one direction while the forward run command is ON for the reference spindle.

Reference spindle			Synchronized spindle	
Rotation signal	**Spindle rotation reversal (SPRR:Y18AA)**	**Motor rotation direction**	**Spindle rotation reversal (SPRR:Y18AA)**	**Motor synchronous rotation direction**
Spindle forward run start (SRN:Y1898)	Invalid	Foward rotation	Invalid	Foward rotation
			Valid	Reverse rotation
	Valid	Reverse rotation	Invalid	Foward rotation
			Valid	Reverse rotation
Spindle reverse run start (SRI:Y1899)	Invalid	Reverse rotation	Invalid	Reverse rotation
			Valid	Foward rotation
	Valid	Foward rotation	Invalid	Reverse rotation
			Valid	Foward rotation

(Note 1) Turn ON the spindle rotation reversal signal for the reference spindle and the synchronized spindle before the spindle synchronization control command.
If you change the spindle rotation reversal signal from ON to OFF or from OFF to ON during the spindle synchronization control, the spindle motor rotation direction is unchanged.

(3) Tool spindle synchronization I A (Spindle-Spindle, Polygon) command

Turning ON the spindle rotation reversal signal (SPRR: Y18AA) reverses the rotation direction of the reference and synchronized spindle motors at the tool spindle synchronization I A command.

When the SPRR signal is ON for the reference spindle, the reference spindle motor rotates in the direction opposite to the spindle rotation signal (spindle forward run start (SRN:Y1898) or spindle reverse run start (SRI:Y1899)). However, the synchronized spindle motor remains in the same rotation direction as when the SPRR signal is OFF for the reference spindle.

When the SPRR signal is ON for the synchronized spindle, the rotation direction of the synchronized spindle motor is reversed.

<Motion example>

Listed below are the state of the SPRR signal and the rotation direction of the reference and synchronized spindle motors when you execute a tool spindle synchronization control I A command that rotates the reference and synchronized spindles in one direction while the forward run command is ON for the reference spindle.

Reference spindle			Synchronized spindle	
Rotation signal	**Spindle rotation reversal (SPRR:Y18AA)**	**Motor rotation direction**	**Spindle rotation reversal (SPRR:Y18AA)**	**Motor synchronous rotation direction**
Spindle forward run start (SRN:Y1898)	Invalid	Forward rotation	Invalid	Foward rotation
			Valid	Reverse rotation
	Valid	Reverse rotation	Invalid	Foward rotation
			Valid	Reverse rotation
Spindle reverse run start (SRI:Y1899)	Invalid	Reverse rotation	Invalid	Reverse rotation
			Valid	Foward rotation
	Valid	Forward rotation	Invalid	Reverse rotation
			Valid	Foward rotation

(Note 1) Turn ON the spindle rotation reversal signal for the reference spindle and synchronized spindles before the tool spindle synchronization control I A command.
If you change the spindle rotation reversal signal from ON to OFF or from OFF to ON during the tool spindle synchronization control I A, the spindle motor rotation direction is unchanged.

(4) Tool spindle synchronization I B (Spindle-Spindle, Polygon) command

Turning ON the spindle rotation reversal signal (SPRR: Y18AA) reverses the rotation direction of the workpiece and rotary tool spindle motors at the tool spindle synchronization I B command.

When the SPRR signal is ON for the workpiece spindle, the workpiece spindle motor rotates in the direction opposite to the spindle rotation signal (spindle forward run start (SRN:Y1898) or spindle reverse run start (SRI:Y1899)). However, the rotary tool spindle motor remains in the same rotation direction as when the SPRR signal is OFF for the workpiece spindle.

When the SPRR signal is ON for the rotary tool spindle, the synchronized rotation direction of the rotary tool spindle motor is reversed.

<Motion example>

Listed below are the state of the SPRR signal and the rotation direction of the workpiece and rotary tool spindle motors when you execute a tool spindle synchronization control I B command that rotates the workpiece and rotary tool spindles in one direction while the forward run command is ON for the workpiece spindle.

Workpiece spindle			Rotary tool spindle	
Rotation signal	**Spindle rotation reversal (SPRR:Y18AA)**	**Motor rotation direction**	**Spindle rotation reversal (SPRR:Y18AA)**	**Motor synchronous rotation direction**
Spindle forward run start (SRN:Y1898)	Invalid	Foward rotation	Invalid	Foward rotation
			Valid	Reverse rotation
	Valid	Reverse rotation	Invalid	Foward rotation
			Valid	Reverse rotation
Spindle reverse run start (SRI:Y1899)	Invalid	Reverse rotation	Invalid	Reverse rotation
			Valid	Foward rotation
	Valid	Foward rotation	Invalid	Reverse rotation
			Valid	Foward rotation

(Note 1) Turn ON the spindle rotation reversal signal for the workpiece and rotary tool spindles before the tool spindle synchronization control I B command.
If you change the spindle rotation reversal signal from ON to OFF or from OFF to ON during the tool spindle synchronization control I B, the spindle motor rotation direction is unchanged.

(5) Tool spindle synchronization II (hob machining) command
Turning ON the spindle rotation reversal signal (SPRR: Y18AA) reverses the rotation direction of the reference spindle motor at the tool spindle synchronization II command.
When the SPRR signal is ON for the reference spindle, the reference spindle motor rotates in the direction opposite to the spindle rotation signal (spindle forward run start (SRN:Y1898) or spindle reverse run start (SRI:Y1899)). However, the C axis motor remains in the same rotation direction as when the SPRR signal is OFF for the reference spindle in the spindle synchronization and spindle superimposition controls.

<Motion example>
Listed below are the state of the SPRR signal and the rotation direction of the reference and synchronized spindle motors when you execute a tool spindle synchronization control II command that rotates the C axis motor to CCW direction in the reference spindle motor forward run while the forward run command is ON for the reference spindle.

Reference spindle			C axis
Rotation signal	**Spindle rotation reversal (SPRR:Y18AA)**	**Motor rotation direction**	**Motor synchronous rotation direction**
Spindle forward run start (SRN:Y1898)	Invalid	Foward rotation	CCW
	Valid	Reverse rotation	
Spindle reverse run start (SRI:Y1899)	Invalid	Reverse rotation	CW
	Valid	Foward rotation	

(Note 1) Select the spindle rotation reversal signal for the reference spindle before the tool spindle synchronization control II command.
If you change the spindle rotation reversal signal from ON to OFF or from OFF to ON during the tool spindle synchronization control II, the spindle motor rotation direction is unchanged.

(6) Spindle superimposition control command
Turning ON the spindle rotation reversal signal (SPRR: Y18AA) reverses the rotation direction of the workpiece and rotary tool spindle motors at the spindle superimposition control command.
When the SPRR signal is ON for the reference spindle, the reference spindle motor rotates in the direction opposite to the spindle rotation signal (spindle forward run start (SRN:Y1898) or spindle reverse run start (SRI:Y1899)). However, the spindle superimposition motor remains in the same rotation direction as when the SPRR signal is OFF for the reference spindle. The superimposed spindle motor for the spindle rotation signal (spindle forward run start (SRN:Y1898) or spindle reverse run start (SRI:Y1899)) rotates in the same direction of the command.
When the SPRR signal is ON for the superimposed spindle, the rotation direction of the superimposed spindle motor is reversed. The superimposed spindle motor for the spindle rotation signal (spindle forward run start (SRN:Y1898) or spindle reverse run start (SRI:Y1899)) rotates in the direction opposite to the command.

<Motion example>
Listed below are the state of the SPRR signal and the rotation direction of the reference and superimposed spindle motors when you execute a spindle superimposition control command that rotates the reference and superimposed spindles in one direction while the forward run command is ON for the reference spindle.

Basic spindle			Superimposed spindle			
Rotation signal	**Spindle rotation reversal (SPRR:Y18AA)**	**Motor rotation direction**	**Spindle rotation reversal (SPRR:Y18AA)**	**Motor synchronous rotation direction (Synchronous rotation for the basic spindle)**	**Rotation signal**	**Motor synchronous rotation direction (Rotation command for the superimposed spindle)**
Spindle forward run start (SRN:Y1898)	Invalid	Foward rotation	Invalid	Foward rotation	Spindle forward run start	Foward rotation
					Spindle reverse run start	Reverse rotation
			Valid	Reverse rotation	Spindle forward run start	Reverse rotation
					Spindle reverse run start	Foward rotation
	Valid	Reverse rotation	Invalid	Foward rotation	Spindle forward run start	Foward rotation
					Spindle reverse run start	Reverse rotation
			Valid	Reverse rotation	Spindle forward run start	Reverse rotation
					Spindle reverse run start	Foward rotation
Spindle reverse run start (SRI:Y1899)	Invalid	Reverse rotation	Invalid	Reverse rotation	Spindle forward run start	Foward rotation
					Spindle reverse run start	Reverse rotation
			Valid	Foward rotation	Spindle forward run start	Reverse rotation
					Spindle reverse run start	Foward rotation
	Valid	Foward rotation	Invalid	Reverse rotation	Spindle forward run start	Foward rotation
					Spindle reverse run start	Reverse rotation
			Valid	Foward rotation	Spindle forward run start	Reverse rotation
					Spindle reverse run start	Foward rotation

(Note 1) Turn ON the spindle rotation reversal signal for the reference and superimposed spindles before the spindle superimposition control command.
If you change the spindle rotation reversal signal from ON to OFF or from OFF to ON during the spindle superimposition control, the spindle motor rotation direction is unchanged.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Spindle rotation direction switch meth-od selection	SPRS	Y18AB	Y190B	Y196B	Y19CB	Y1A2B	Y1A8B	Y1AEB	Y1B4B

[Function]

This signal is used to select the method to reverse the rotation signal (forward run start and reverse run start) of the spindle.

[Operation]

Depending on the status of this signal, the spindle rotation signal (forward run start or reverse run start) can be switched to the opposite direction by "#3127 SPECSP (Spindle specification)/bit3" or the spindle rotation reversal signal (SPRR:Y18AA).

OFF: Switched by "#3127 SPECSP (Spindle specification)/bit3".

ON: Switched by the spindle rotation reversal signal (SPRR:Y18AA).

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	PLC COIL CHANGEOVER	MPCSL	Y18AF	Y190F	Y196F	Y19CF	Y1A2F	Y1A8F	Y1AEF	Y1B4F

[Function]

When the coil changeover is the NC internal process, the coil changeover with the PLC signal can be performed with this signal.

[Operation]

If the coil changeover is the NC internal process, the NC internal process selection is interrupted and changed to the selection with the PLC signal when this signal is turned ON.

The coil changeover in the NC internal process and the coil changeover via the PLC are changed over with the parameter #1239 set11/bit0.

0: Via PLC

1: NC internal process

(1) H/L coil changeover

- The L -> H coil changeover is changed over at the same time when the H coil selection is entered.
- The H -> L coil changeover is not changed over during the "Speed detection" signal (VRO) OFF even if the L coil selection is entered.
  The coil changeover is changed over after the "Speed detection" signal (SD) is turned ON.

(2) H/M/L coil changeover

- The L -> M coil changeover is changed over at the same time when the M coil selection is entered.
- The L -> H coil changeover is changed over at the same time when the H coil selection is entered.
- The M -> H coil changeover is changed over at the same time when the M coil selection is entered.
- he H -> M coil changeover is not changed over during the "Speed detection 2" signal (SD2) OFF even if the M coil selection is entered.The coil changeover is changed over after the "Speed detection 2" signal (SD2) is turned ON.
- The H -> L coil changeover is not changed over during the "Speed detection" signal (VRO) OFF even if the L coil selection is entered.The coil changeover is changed over after the "Speed detection" signal (VRO) is turned ON.
- The M -> L coil changeover is not changed over during the "Speed detection" signal (VRO) OFF even if the L coil selection is entered.The coil changeover is changed over after the "Speed detection" signal (VRO) is turned ON.

(Note) This signal must be turned ON after the "L coil selection" (LRSL)/ "M coil selection" (LRSM) signal has been decided. The NC internal changeover process is entered when this signal is turned OFF, so note the spindle rotation speed.

[Related signals]

(1) L coil selection (LRSL: Y189F)
(2) M coil selection (LRSM: Y18A6)
(3) In L coil selection (LCSA: X188F)
(4) In M coil selection (MCSA: X189E)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION	SPSY	Y18B0	Y1910	Y1970	Y19D0	Y1A30	Y1A90	Y1AF0	Y1B50

[Function]

The spindle synchronous control mode is entered by turning this signal ON.

[Operation]

The spindle synchronous control mode is entered by inputting the "Spindle synchronous control" signal (SPSY). During the spindle synchronous control mode, the synchronized spindle is controlled in synchronization with the rotation speed commanded for the reference spindle.

Set the reference spindle, synchronized spindle and rotation direction beforehand.

Device No.	Signal name	Abbrev	Explanation
R7016	Spindle synchronous control reference spindle selection	-	Select a serially connected spindle to be controlled as the reference spindle. (0: 1st spindle), 1: 1st spindle, 2: 2nd spindle, 3: 3rd spindle, 4: 4th spindle, 5: 5th spindle, 6: 6th spindle (Note 1)Spindle synchronization control will not take place if a spindle not connected in serial is selected. (Note 2)If "0" is designated, the 1st spindle will be controlled as the reference spindle.
R7017	Spindle synchronous control synchronized spindle selection	-	Select a serially connected spindle to be controlled as the synchronized spindle. (0: 2nd spindle), 1: 1st spindle, 2: 2nd spindle, 3: 3rd spindle, 4: 4th spindle, 5: 5th spindle, 6: 6th spindle (Note 3)Spindle synchronization control will not take place if a spindle not connected in serial is selected or if the same spindle as the reference spindle is selected. (Note 4)If "0" is designated, the 2nd spindle will be controlled as the synchronized spindle.
Y18B2	Spindle synchronous rotation direction	-	Designate the reference spindle and synchronized spindle rotation directions for spindle synchronization control. 0:The synchronized spindle rotates in the same direction as the reference spindle. 1:The synchronized spindle rotates in the reverse direction of the reference spindle.

[Related signals]

(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle synchronous rotation direction (SPSDR: Y18B2)
(4) Spindle phase synchronization (SPPHS: Y18B1)
(5) Spindle phase synchronization completion (FSPPH: X18AA)
(6) Spindle synchronous control reference spindle selection (R7016)
(7) Spindle synchronous control synchronized spindle selection (R7017)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE PHASE SYNCHRONIZATION	SPPHS	Y18B1	Y1911	Y1971	Y19D1	Y1A31	Y1A91	Y1AF1	Y1B51

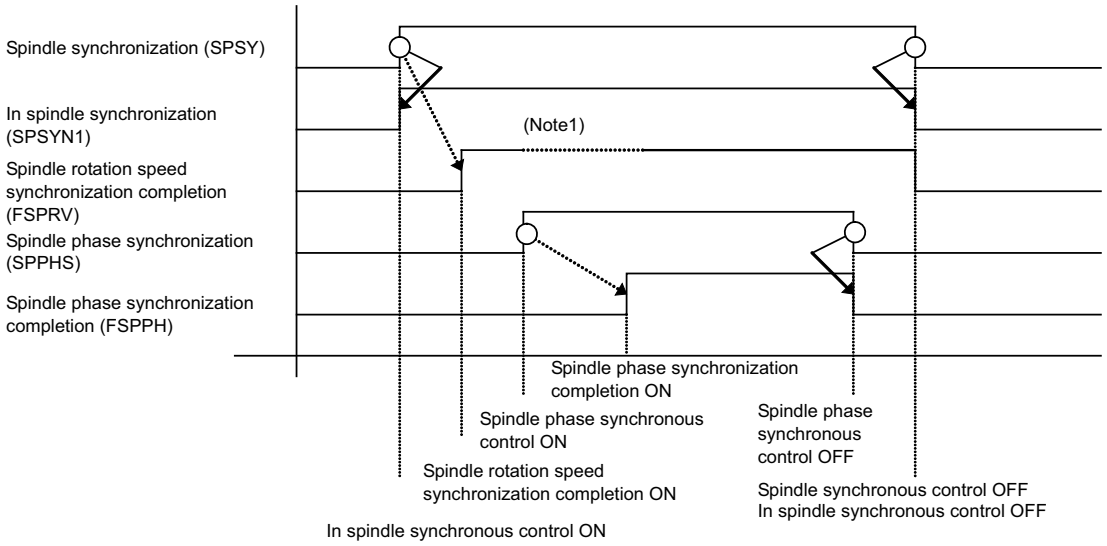
[Function]

Spindle phase synchronization starts when this signal is turned ON during the spindle synchronous control mode.

[Operation]

Spindle phase synchronization starts when the "Spindle phase synchronous control" signal (SPPHS) is input during the spindle synchronous control mode. The "Spindle phase synchronization completion" signal is output when the spindle phase synchronization attainment level setting value (#3051 spplv) is reached.

(Note) This signal will be ignored even if it is turned ON during a mode other than the spindle synchronous control mode.


Spindle synchronization (SPSY)
In spindle synchronization (SPSYN1)
Spindle rotation speed synchronization completion (FSPRV)
Spindle phase synchronization (SPPHS)
Spindle phase synchronization completion (FSPPH)
(Note1)
Spindle phase synchronization completion ON
Spindle phase synchronous control ON
Spindle phase synchronous control OFF
Spindle rotation speed synchronization completion ON
Spindle synchronous control OFF
In spindle synchronous control OFF
In spindle synchronous control ON

(Note 1) This is turned OFF once to change the rotation speed during phase synchronization.

[Related signals]

(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle synchronization (SPSY: Y18B0)
(4) Spindle synchronous rotation direction (SPSDR: Y18B2)
(5) Spindle phase synchronization completion (FSPPH: X18AA)
(6) Spindle synchronization phase shift amount (R7018)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONOUS ROTATION DIRECTION	SPSDR	Y18B2	Y1912	Y1972	Y19D2	Y1A32	Y1A92	Y1AF2	Y1B52

[Function]

The synchronized spindle's rotation direction is designated with this signal. Select whether the direction is the same as or the reverse of the reference spindle.

[Operation]

Designate the rotation direction for the reference spindle and synchronized spindle during spindle synchronous control.

0: Synchronized spindle rotates in same direction as reference spindle.

1: Synchronized spindle rotates in reverse direction of reference spindle.

[Related signals]

(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle synchronization (SPSY: Y18B0)
(4) Spindle phase synchronization (SPPHS: Y18B1)
(5) Spindle phase synchronization completion (FSPPH: X18AA)
(6) Spindle synchronization phase shift amount (R7018)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	PHASE SHIFT CALCULATION REQUEST	SSPHM	Y18B3	Y1913	Y1973	Y19D3	Y1A33	Y1A93	Y1AF3	Y1B53

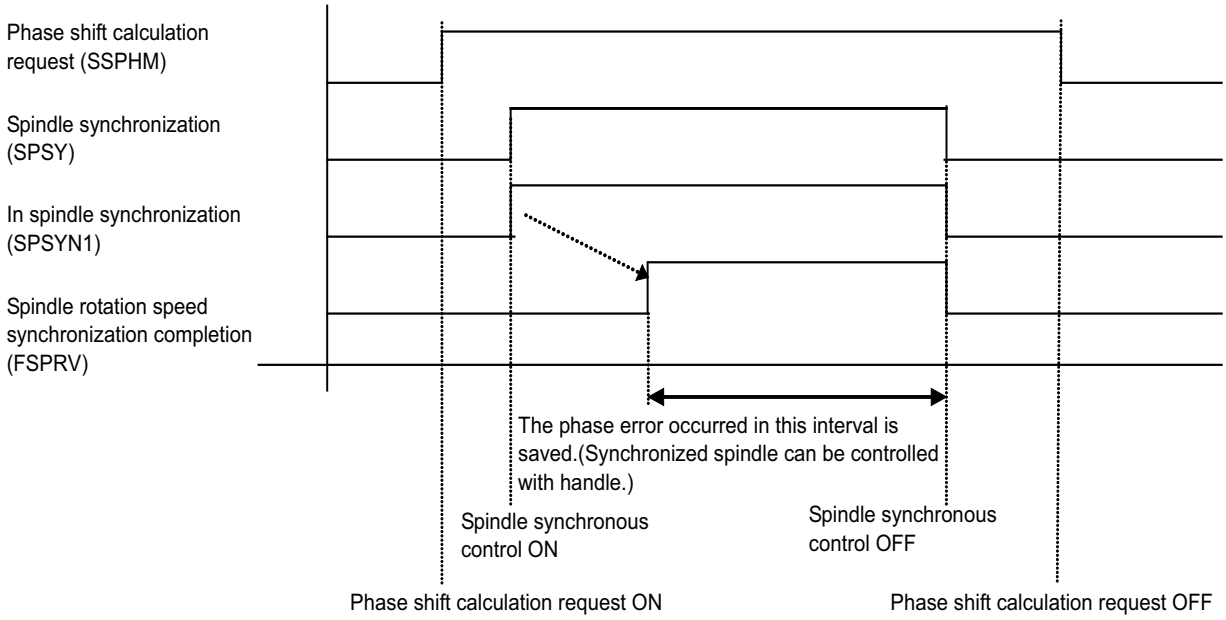
[Function]

This signal calculates the phase error of the reference spindle during rotation synchronization, and requests that it be saved in the NC memory.

[Operation]

The phase error of the reference spindle and synchronized spindle is saved in the NC memory when this signal is ON and the rotation synchronization command's (with no R address command) spindle synchronization is completed (when "Spindle rotation speed synchronization completion" signal is ON).

This signal turns ON when the spindle rotation is stopped before the rotation synchronization command.


Phase shift calculation request (SSPHM)
Spindle synchronization (SPSY)
In spindle synchronization (SPSYN1)
Spindle rotation speed synchronization completion (FSPRV)
The phase error occurred in this interval is saved.(Synchronized spindle can be controlled with handle.)
Spindle synchronous control ON
Spindle synchronous control OFF
Phase shift calculation request ON
Phase shift calculation request OFF

(Note 1) The phase cannot be aligned when calculating the phase shift.

(Note 2) If the handle mode is selected as the manual operation mode, the synchronized spindle cannot be rotated with the handle.

[Related signals]

(1) Phase offset request (SSPHF: Y18B4)

(2) Spindle synchronization phase error/Hob axis delay angle (R6516)

(3) Spindle synchronization Phase offset data (R6518)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	PHASE OFFSET REQUEST	SSPHF	Y18B4	Y1914	Y1974	Y19D4	Y1A34	Y1A94	Y1AF4	Y1B54

[Function]

This signal requests that the phase be aligned to the value obtained by adding the value commanded with the phase synchronization command's R address to the phase error of the reference spindle and synchronized spindle saved with the "Phase shift calculation request" signal (SSPHM).

[Operation]

If phase synchronization is commanded (with R address command) while this signal is ON, the reference spindle and synchronized spindle phases will be aligned to attain the phase error obtained by adding the value commanded with the R address command to the phase error of the reference spindle and synchronized spindle saved in the NC memory.

[Related signals]

(1) Phase shift calculation request (SSPHM: Y18B3)

(2) Spindle synchronization phase error/Hob axis delay angle (R6516)

(3) Spindle synchronization Phase offset data (R6518)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	ERROR TEMPORARY CANCEL	SPDRPO	Y18B5	Y1915	Y1975	Y19D5	Y1A35	Y1A95	Y1AF5	Y1B55

[Function]

This signal cancels the error caused by the speed fluctuation when the chuck is closed.
When the chuck is closed, the speed will fluctuate due to external causes. An error will occur between the reference spindle's position and the synchronized spindle's position due to this speed fluctuation. This signal is used to cancel this error. (If spindle synchronization is attempted when closing the chuck without canceling this error, torsion could occur.)

[Operation]

The error between the reference spindle's position and synchronized spindle's position is saved when this signal changes from OFF to ON. The saved error is canceled and the spindle is synchronized while this signal is ON. (Even if the chuck close signal is OFF, the error will be canceled while the "Error temporary cancel" signal is ON.)

(Note 1) Turn this signal ON after the chucks on both the reference spindle side and synchronized spindle side have closed and grasped the workpiece.

(Note 2) Turn this signal OFF when the either the reference spindle side or synchronized spindle side chuck is open.

(Example)

(1) Close the reference spindle side chuck.
(2) Start spindle synchronization (G114.1).
(3) Close the synchronized spindle side chuck.
(The speed will fluctuate due to external causes at this time, and an error will occur.)
(4) Using the "Chuck close confirmation" (SPCMP) signal, check that the chucks are closed.
(5) Turn the "Error temporary cancel" (SPDRPO) signal ON, and cancel the error.
(6) Execute machining with spindle synchronous control.
(7) Open the chuck on the synchronized spindle side.
(8) Using the "Chuck close confirmation" (SPCMP) signal, check that the chuck is opened.
(9) Turn the "Error temporary cancel" (SPDRPO) signal OFF, and stop the error cancellation.

[Related signals]

(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle phase synchronization completion (FSPPH: X18AA)
(4) Chuck close confirmation (SPCMP: X18AC)
(5) Chuck close (SPCMPC: Y18B9)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION/ SUPERIMPOSITION CANCEL	SPSYC	Y18B8	Y1918	Y1978	Y19D8	Y1A38	Y1A98	Y1AF8	Y1B58

[Function]

This signal is used to cancel the spindle synchronous control and spindle superimposition with the G114.n command.
The spindle synchronous control with the "Spindle synchronization" (Y18B0) is not canceled.
(Note) This signal uses the 1st spindle signal regardless of the hob spindle's number.

[Operation]

The spindle synchronous control mode and spindle superimposition can be canceled by turning this signal ON.

[Related signals]

(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle phase synchronization completion (FSPPH: X18AA)
(4) Spindle phase synchronization (SPPHS: Y18B1)
(5) Spindle synchronization phase error 1 (R6522)
(6) Spindle synchronization phase error 2 (R6523)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	CHUCK CLOSE	SPCMPC	Y18B9	Y1919	Y1979	Y19D9	Y1A39	Y1A99	Y1AF9	Y1B59

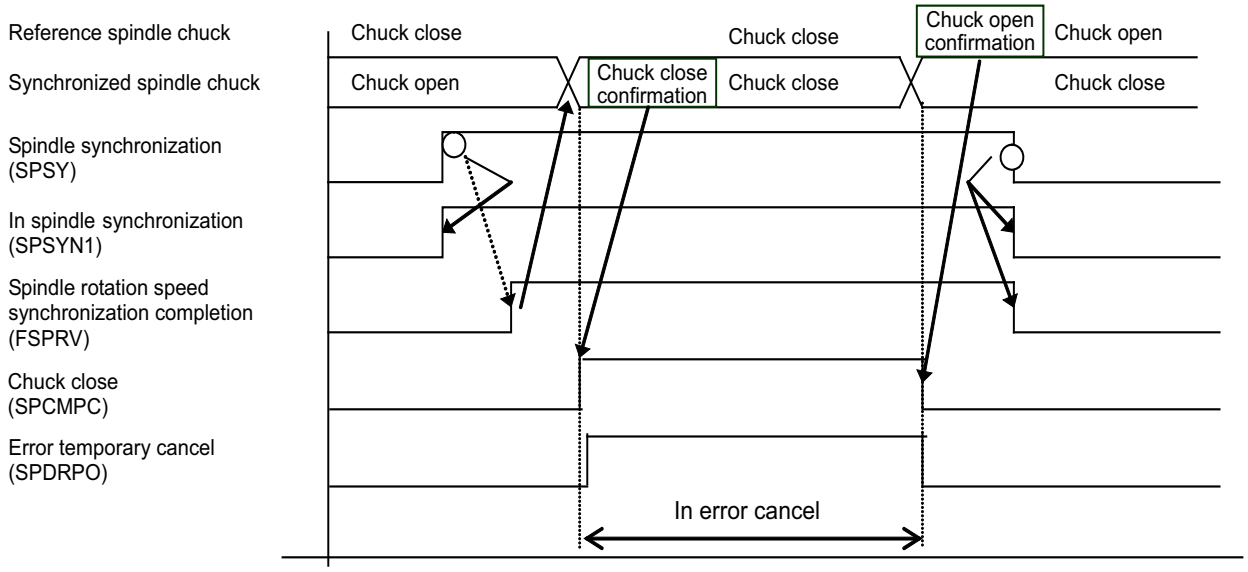
[Function]

This signal is turned ON while the reference spindle and synchronized spindle clamp the same work.

[Operation]

The "Spindle chuck close confirmation" signal is turned ON when the "Chuck close" signal is ON.

The "Spindle chuck close confirmation" signal is turned OFF when the "Chuck close" signal is OFF.



(Note) Use the "Error temporary cancel" only when the rotation error between the reference spindle and synchronized spindle occurs because of the "Chuck close" signal.

[Related signals]

(1) "Chuck close confirmation" signal (SPCMP: X18AC)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE OFF REQUEST	SPOFF	Y18BF	Y191F	Y197F	Y19DF	Y1A3F	Y1A9F	Y1AFF	Y1B5F

[Function]

This signal commands to exclude the spindle from CNC control.

[Operation]

The corresponding spindle will be excluded from CNC control when this signal is ON.

[Related signals]

(1) IN SPINDLE OFF (SPOFFA:X18B6)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Spindle oscillation command		Y18C8	Y1928	Y1988	Y19E8	Y1A48	Y1AA8	Y1B08	Y1B68

[Function]

This signal is used to start or stop the spindle oscillation.

[Operation]

The spindle oscillation is started by turning this signal ON.

The spindle oscillation is stopped by turning this signal OFF.

[Related signals]

(1) Spindle oscillation amplitude (R7020)

(2) Spindle oscillation frequency (R7021)

(3) Spindle oscillation in progress (X18C8)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
	REAL-TIME TUNING 1: SPEED CONTROL GAIN HOLD-DOWN COMMAND	VGHLDC	Y18CA	Y192A	Y198A	Y19EA	Y1A4A	Y1AAA	Y1B0A	Y1B6A

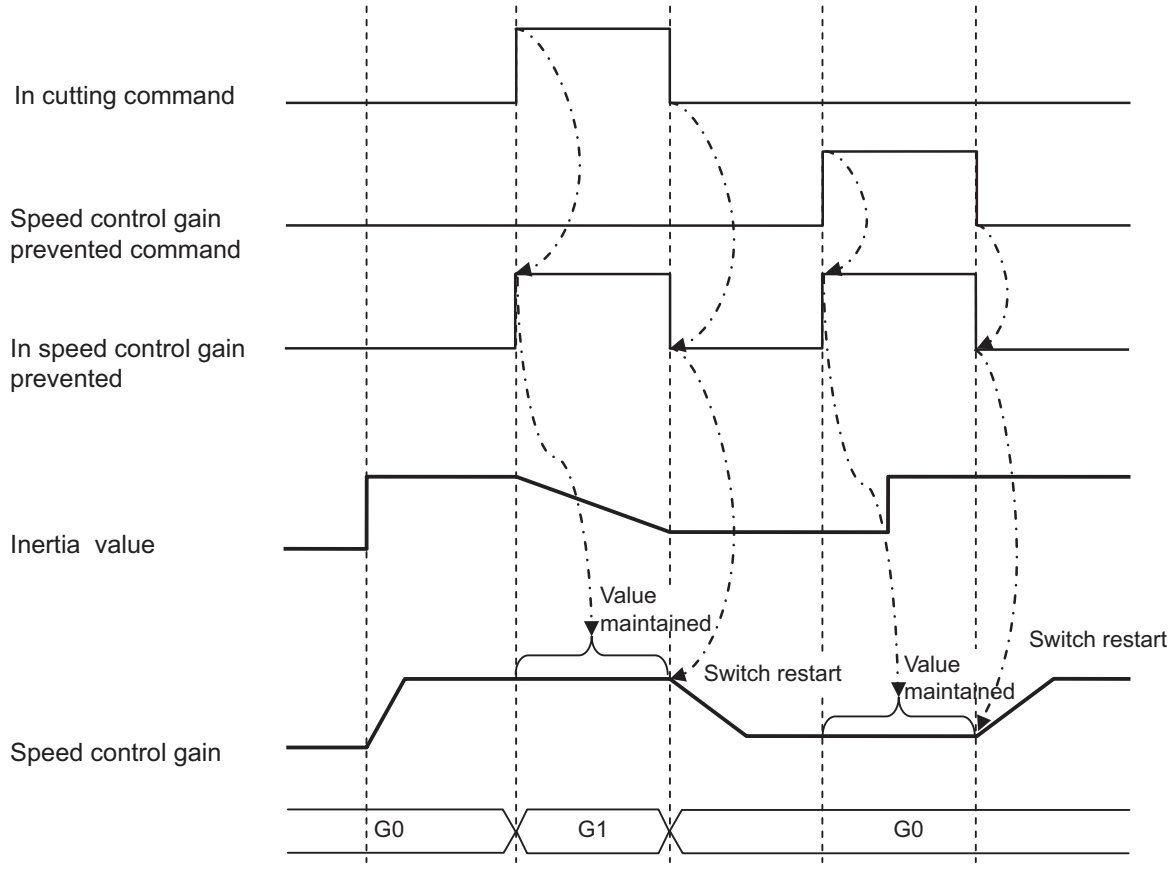
[Function]

This signal is used to stop speed control gain switching of the real-time tuning 1 function. Speed control gain switching is stopped if this signal turns ON while this function is enabled.

[Operation]

ON: Speed control gain switching is stopped.

OFF: Speed control gain switching is not stopped.



[Related signals]

Real-time tuning 1: Speed gain hold-down ON (VGHLD:X18CA)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	POSITION SWITCH n INTERLOCK		Y1D00 to 17	Y1D20 to 37	Y1D40 to 57	Y1D60 to 77	Y1D80 to 97	Y1DA0 to B7	Y1DC0 to D7	Y1DE0 to F7

[Function]

An interlock is applied on the axis when outside the position switch range, and movement of the axis targeted by the position switch is prohibited.

[Operation]

When this signal turns ON and the axis targeted for the corresponding position switch is outside the range, an interlock will be applied on the axis, and movement will be prohibited. Movement is possible within the set range.

- Movement in interlock range

  [For linear axis]

  The axis can move only in the direction toward the position switch range.If a command is issued in the direction that moves away from the position switch range, "M01 OPERATION ERROR 0004 *" (* is axis name) will occur.

  [For rotary axis]

  If axis movement is commanded in the interlock state, "M01 OPERATION ERROR 0004 *" (* is axis name) will occur. To move the axis, turn the "Position switch interlock" signal input OFF and cancel the interlock state. Note that even if the axis is moved away from the position switch range in this state, the interlock will not be applied.

- Coasting distance

  The coasting distance when outside the position switch range by axis movement depends on the commanded speed and parameter setting.

  [Coasting distance for position switch interlock]

Pcheck	<check>	Coasting distance
0	0	The acceleration/deceleration delay is added to the movement distance within the commanded speed × 0.060 [s] or less.
0	1	Same as the above distance. (When Pcheck is 0, the <check> setting is invalid.)
1	0	Within commanded speed × 0.015 [s] or less (During manual mode, commanded speed × 0.030 [s] or less)
1	1	Acceleration/deceleration delay or position loop gain delay is added to above distance.

[Caution]

(1) When moving from the set range to outside the range, the coasting distance up to when the axis stops will differ according to the position switch method.

(2) The position switch interlock is invalid for a reference position return incomplete axis (incremental specifications) absolute position initialization incomplete axis and an axis for which absolute position initialization is being carried out.

(3) The position switch range is judged with the machine coordinate system. Thus, the inclined axis is judged with the oblique (actual axis).

If the basic axis moves with a command issued for the inclined axis, the axis interlock will not be applied even if the basic axis moves out of the position switch range. (The interlock is valid only for the commanded axis.)

[Related signals]

(1) Position switch (PSW1 to 24: X1D00 to X1D17)

4.4 PLC Output Signals (Data Type: R***)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	ANALOG OUTPUT m	AOn	R200 to 3

[Function]

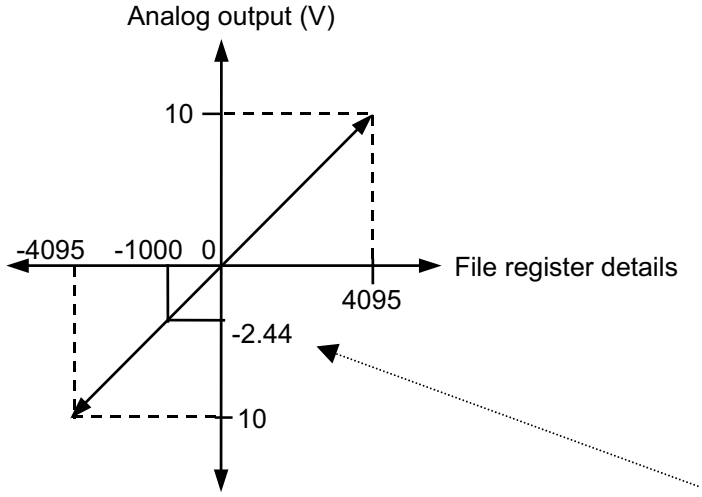
An analog voltage can be output from the designated connector on the remote I/O unit with analog output or built-in AI/AO by setting designated data in the file registers.

[Operation]

"Analog voltage" signal (for speed control) can be output by setting signed binary data to the corresponding file register. The analog output interface is explained below.

Channel	File register (R)
AO1	R200
AO2	R201
AO3	R202
AO4	R203

<Relation of file register details and analog output voltage>



Output voltage : -10V to +10V (±5%)
Resolution : 2^{12} (1/4095) x Fullscal
Load conditions : 10kohm resistance load (standard)
Output impedance: 220ohm

$$\text{Output voltage} = \frac{-1000}{4095} \times 10\text{V} = -2.44\text{V}$$

<Relation of file register details and output voltage>

The output voltage is

Rn															n = 100 to 103
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
1	1	1	1	1	1	0	0	0	0	0	1	1	0	0	0

← When -1000 (FC18 with hexadecimal)

The data is input as binary coded data.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	DISPLAYED SCREEN NO.		R210

[Function][Operation]

The No. of the screen displayed by the screen change key is registered.

The following table shows the screen change keys and the corresponding Nos. to be registered.

Screen change key		Displayed screen No. to be set in the R register
(MONITOR)	Monitor	1
(SETUP)	Setup	2
(EDIT)	Edit	3
(DIAGN)	Diagnosis	4
(MAINTE)	Maintenance	5
		9
		10
	Window display	13
	Window selection	14

[Caution]

(1) This register is not retained after the power OFF. The data is initialized to "0" at the power ON.

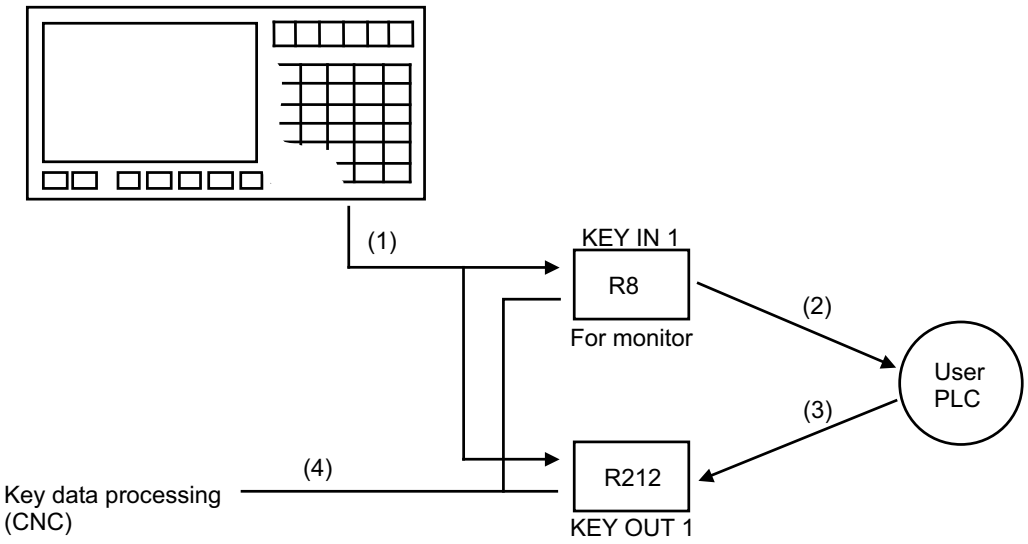
(2) The displayed screen No. is not set in this register when the PLC onboard or the custom application (EXE) is closed without the screen change keys (with [ ], [Close] buttons and so on). When the standard screen is displayed in the forefront after the application has been closed, the displayed screen No. on the standard screen is set in this register.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	KEY OUT 1		R212

[Function]

When this signal is used, key data can be entered on the user PLC side instead of the CNC keyboard.

[Operation]



(1) Key data is set to file registers R8 and R212 at the head of user PLC main program.
(2) The user PLC refers to the key data, and performs required processing.
(3) The user PLC sets the key data which meets the keyboard currently in use to register R212.
(4) The controller processes the effective key data after the main program of user PLC has been processed, referring to the settings of R8 and R212.

[Related signals]

(1) KEY IN 1 (R8)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	POWER OFF INDICATION Y DEVICE NO.		R215

[Function][Operation]

This signal sets the Y device to notify the control unit's power OFF.
The setting range is 0 to 5FF(HEX).
Set the Y device No. taking the hardware configuration into consideration.
Designate binary data for Y device No.
When a Y device No. outside the setting range is set, this signal will not be output to the Y device.
Refer to the "Automatic power OFF request" signal (Y75D) for details.

[Related signals]

(1) Power OFF processing (X707)
(2) Automatic power OFF request (Y75D)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	DETAILED SCREEN NO.		R216

[Function][Operation]

The Detailed screen No. of the screen displayed by the menu key is registered.

The following table shows the menu keys and the corresponding Detailed screen No. to be registered.

Monitr		Setup		Edit		Diagn		Mainte	
Monitor Screens	100	T-ofs	201	Edit	301	Config	401	Mainte	501
Search	101	T-meas	202	Check (3D)	302	Option	402	Param	502
Reserch	102	T-reg	203	Check (2D)	351	I/F dia	403	I/O	503
Edit	103	T-life	204	NAVI MILL	10001	Drv mon	404		
Trace	104	Coord	205	NAVI LATHE	10301	Mem dia	405	Option setting	550
Check (3D)	105	W-meas	206	I/O	305	Alarm	406	All backup	551
Check (2D)	151	User	207			-	-	System setup	552
Cnt exp	106	MDI	208			-	-	Adjust S-ana	553
Offset	107	Cnt set	209			-	-	To Abs pos	554
Coord	108	MST	210			-	-	Protect setting	555
Cnt set	109	T-list	211			Selfdia	411	Servo diagn	556
MST	110	Pallet	212			NC Smp	412	Collect set	557
Modal	111	T-Mng.	213					Open device	558
Tree	112	-	-					Open SRAM	559
Time	113	Storage	215					Ext PLC link	560
Com var	114	Surf	216						
Loc var	115	Mac cond	217					PLC onboard	11000
P corr	116	Barrier data	218						
PLC SW	117								
G92 set	118								
Col stp	119								
LD MTR	120								
Sp-stby	121								
TipDisp	122								
All sp	123								
Dsp sw.	(Note 1)								
-	-								
S-sel	126								
Next axis	(Note 1)								
W-shift	128								

Custom open screen	
F0 open (compile method, interpreter method)	6000 to 7999
Menu open (compile method, interpreter method)	8000 to 9999
Menu open (execution file registration method)	20000 to 20099
F0 open (execution file registration method)	20100

(Note 1) As there is no screen for Next axis and Dsp change, use the detailed screen No. for the operation screen, "100".

(Note 2) The displayed screen No. and detailed screen No. are not be updated for the guidance screen and menu list screen even when they are displayed.
The previous displayed screen No. and detailed screen No. remain.

[Caution]

(1) This register is not retained after the power OFF. The data is initialized to "0" at the power ON.

(2) The displayed screen No. is not set in this register when the PLC onboard or the custom application (EXE) is closed without the screen change keys (with [x], [Close] buttons and so on). When the standard screen is displayed in the forefront after the application has been closed, the displayed screen No. on the standard screen is set in this register.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	USER SEQUENCE PROGRAM VERSION CODE		R224 to 7

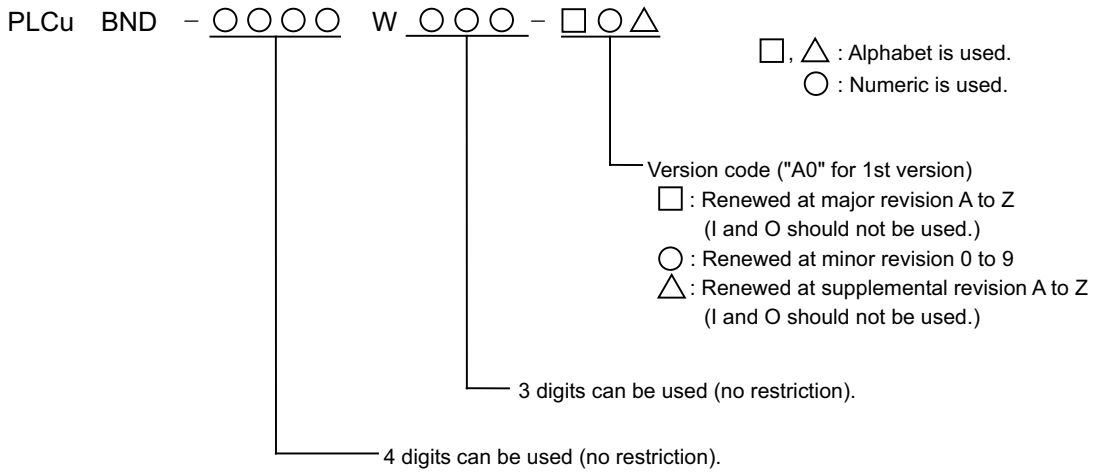
[Function]

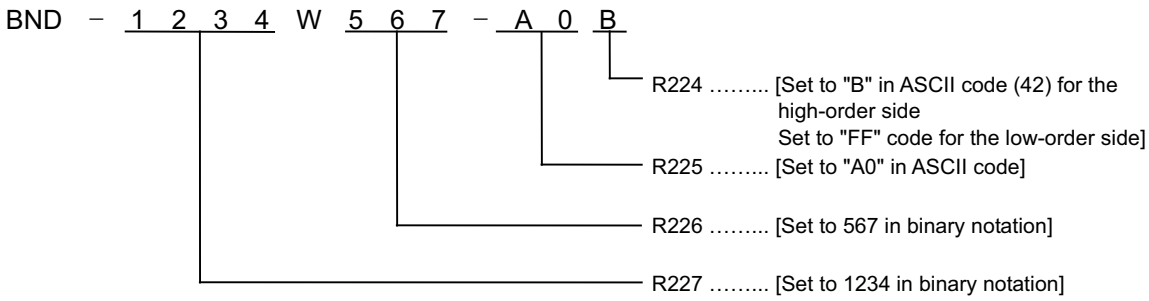
The user sequence program version can be displayed with the software version that controls the other controller on the setting and display unit (communication terminal) DIAGNOSIS screen.

[Operation]

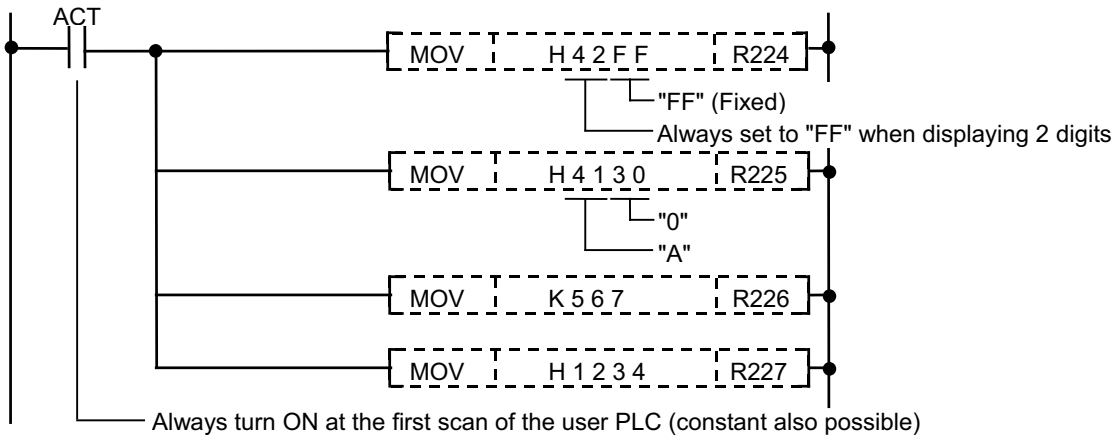
Characters to be displayed are placed in ASCII code.

<Display format>


PLCu BND − ○○○○ W ○○○ − □○△
□, △ : Alphabet is used.
○ : Numeric is used.
Version code ("A0" for 1st version)
□ : Renewed at major revision A to Z
(I and O should not be used.)
○ : Renewed at minor revision 0 to 9
△ : Renewed at supplemental revision A to Z
(I and O should not be used.)
3 digits can be used (no restriction).
4 digits can be used (no restriction).


BND − 1 2 3 4 W 5 6 7 − A 0 B
R224 ..... [Set to "B" in ASCII code (42) for the high-order side
Set to "FF" code for the low-order side]
R225 ..... [Set to "A0" in ASCII code]
R226 ..... [Set to 567 in binary notation]
R227 ..... [Set to 1234 in binary notation]

(Program example)



Con-tact	Signal name	Signal abbreviation	Common for part systems
A	USER SEQUENCE PROGRAM VERSION CODE 2		R232 to 9

[Function]

This signal enables the user sequence program version to be displayed, together with the software version controlling another control unit, in the DIAGNOSIS screen of the setting display unit (communication terminal).

[Operation]

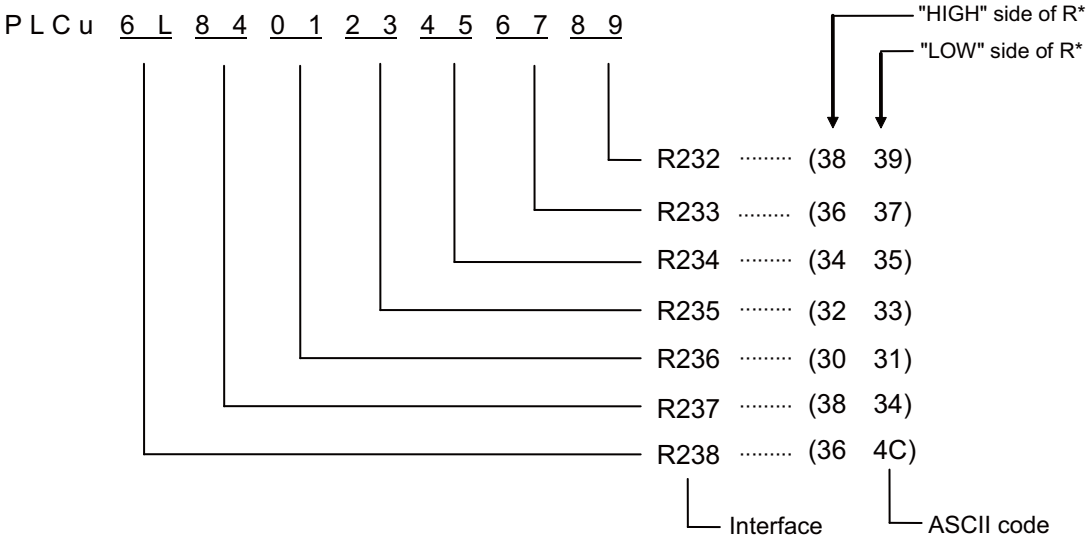
The ASCII code that corresponds to the character to be displayed in the version display interface is set.

<Display format and usage example>

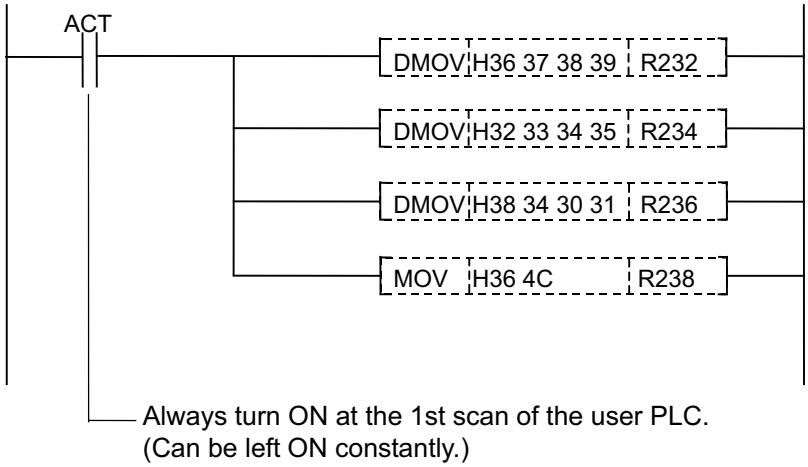
P L C u □ □ □ □ □ □ □ □ □ □ □ □ □ □

Total of 14 characters

□ : Random alphanumeric characters are used.



(Program example)


ACT
DMOV H36 37 38 39 R232
DMOV H32 33 34 35 R234
DMOV H38 34 30 31 R236
MOV H36 4C R238
Always turn ON at the 1st scan of the user PLC.
(Can be left ON constantly.)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	APLC VERSION		R240 to 3

[Function]

This signal indicates APLC software version.

[Operation]

File register R240 to R243 is as the following data.
R240 to R243 is as the following data.

(Example) BND-1003W400-A0B
(1) (2) (3)

Item		File register	Type	Example
(1)	Model function No.	R240	Binary	1003=03EBH
(2)	Serial No.	R241	Binary	400=0190H
(3)	Version	Bits 7 to 0 of R242	ASCII code	A=41H
		Bits F to 8 of R242	ASCII code (Note1)	0=30H
		Bits 7 to 0 of R243	ASCII code (Note1)	B=42H
-	-	Bits F to 8 of R243	Always FFH (Note2)	FFH

(Note1) If the version is 1-digit No., set the version in bits 7 to 0 of R242, and set "00H" in bits F to 8 of R242 and bits 7 to 0 of R243.

(Note2) Always set "FFH" in bits F to 8 of R243. If not, it will not be displayed correctly.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	OT IGNORED		R248,9

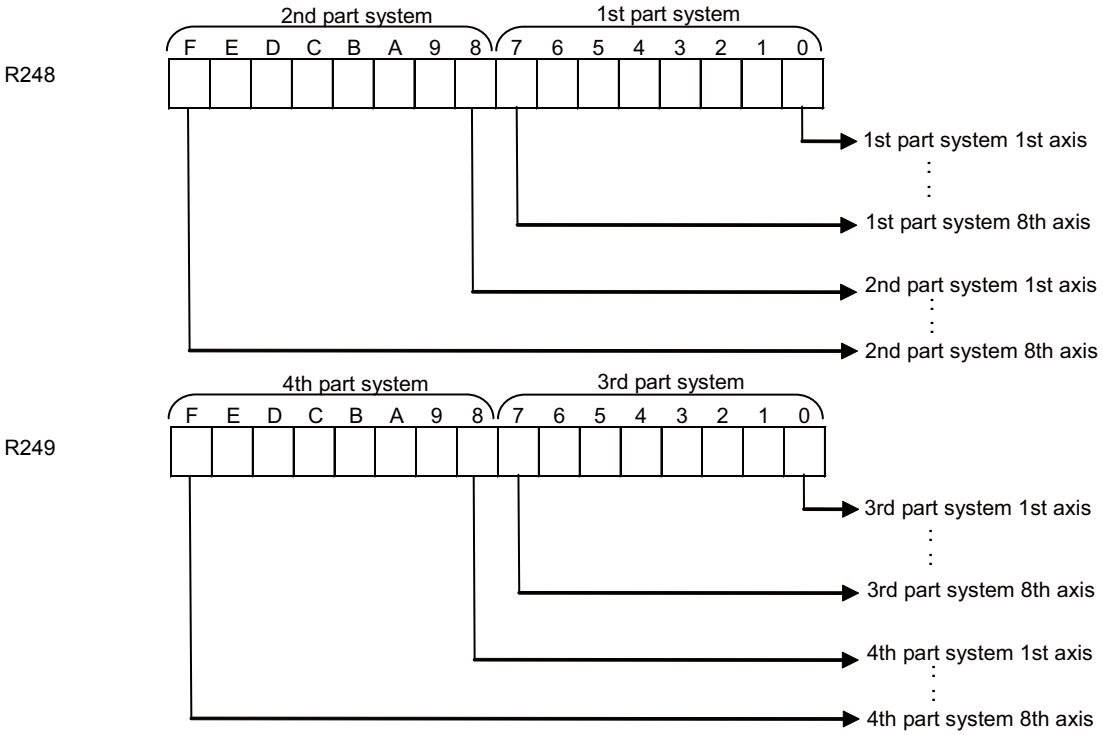
[Function]

When this signal is used, "stroke end error" can be avoided without eternal wiring for stroke end signal (remote I/O connector pin No. fixed signal) provided for each axis. "Stroke end" signal on axis for which the "OT ignored" signal is set can be used for other purpose.

[Operation]

"Stroke end error" signal associated with a specific axis motion can be ignored.

The interface for this signal is as follows:


2nd part system
1st part system
F E D C B A 9 8 7 6 5 4 3 2 1 0
R248
1st part system 1st axis
1st part system 8th axis
2nd part system 1st axis
2nd part system 8th axis
4th part system
3rd part system
F E D C B A 9 8 7 6 5 4 3 2 1 0
R249
3rd part system 1st axis
3rd part system 8th axis
4th part system 1st axis
4th part system 8th axis

(Note 1) The signal is applicable to (+) and (-) motion at the same time (ignored when "ON").

(Note 2) "OT" is abbreviation of "Over Travel".

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PLC AXIS OT IGNORED		R255

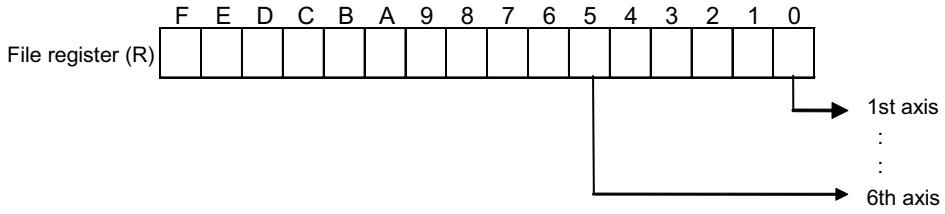
[Function]

When this signal is used, "stroke end error" can be avoided without eternal wiring for stroke end signal (remote I/O connector pin No. fixed signal) provided for each axis. "Stroke end" signal on axis for which the "PLC axis OT ignored" signal is set can be used for other purpose.

[Operation]

"Stroke end error" signal associated with a specific axis motion can be ignored.

The interface for this signal is as follows:



(Note 1) The signal is applicable to (+) and (-) motion at the same time (ignored when "ON").

(Note 2) "OT" is abbreviation of "Over Travel".

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	NEAR-POINT DOG IGNORED		R272,3

[Function]

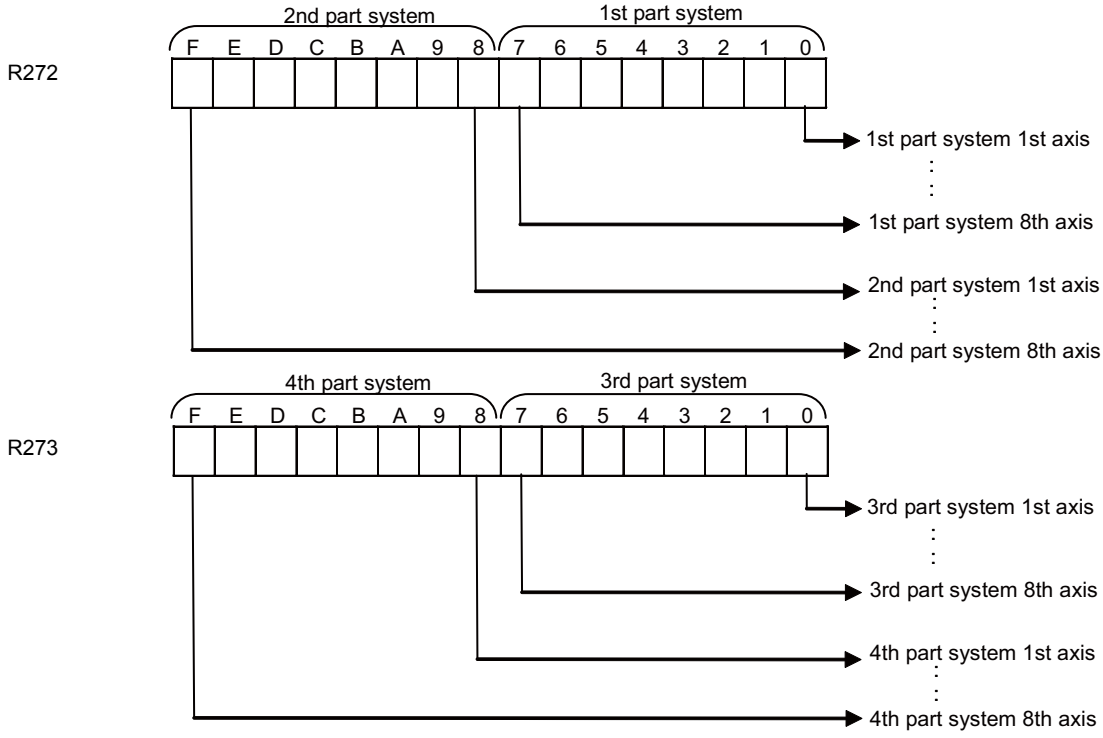
When this signal is used, "Near point detection" signal (remote I/O connector pin No. fixed signal) which is used for dog type reference position return can be ignored (dog not-passed state).

Furthermore, the "Near point detection" signal for an axis to which the "Near-point ignored" signal is set can be used for other applications.

[Operation]

When the signal is turned ON, "Near point detection" signal for the corresponding control axis can be ignored.

The interface is shown below:



Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PLC AXIS NEAR-POINT DOG IGNORED		R279

[Function]

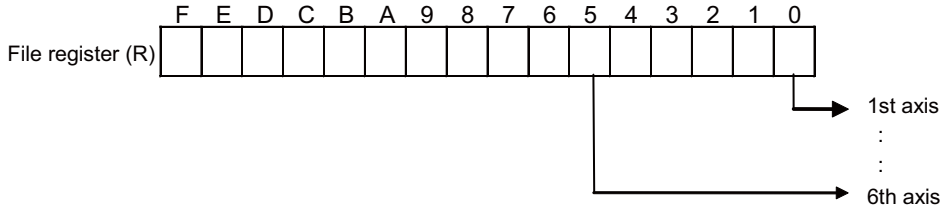
When this signal is used, "Near point detection" signal (remote I/O connector pin No. fixed signal) which is used for dog type reference position return can be ignored (dog not-passed state).

Furthermore, the "Near point detection" signal for an axis to which the "PLC axis near-point ignored" signal is set can be used for other applications.

[Operation]

When the signal is turned ON, "Near point detection" signal for the corresponding control axis can be ignored.

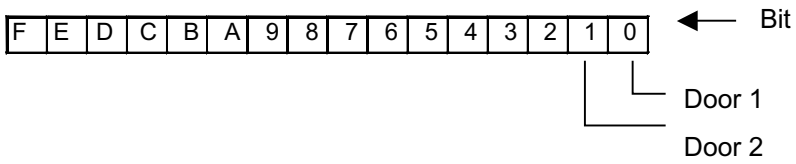
The interface is shown below:



Con-tact	Signal name	Signal abbreviation	Common for part systems
A	SPEED MONITOR MODE	SOMD	R296

[Function]

This signal executes speed monitor function for the control axis for which a valid door No. is selected with parameter "#2118 SscDrSel" and the spindle for which a valid door No. is selected with parameter "#3071 SscDrSelSp".
The door No. corresponds to the following bits.



[Operation]

NC performs as follows by turning the speed monitor signal ON.

(1) Checks compatibility of speed monitor parameter
(2) Checks if NC's speed monitor parameter matches with the speed monitor parameter sent to servo drive unit and spindle drive unit.
(3) Notifies speed monitor command to the drive unit
(4) Executes the speed monitor function on NC
(5) Turns ON speed monitor door open possible signal when NC receives the in speed monitor mode signal from the drive unit

The followings are performed while the speed monitor function is executed.

Item	Details
Monitoring command speed	When a command speed NC outputs to the drive unit exceeds a safety speed set with parameter, an emergency stop occurs.
Monitoring feed back speed	When a motor rotation speed sent to NC from the drive unit exceeds a safety rotation speed set with parameter, an emergency stop occurs.
Monitoring feed back position	When a difference between feedback position sent to NC from the drive unit and a position commanded by NC is large, an emergency stop occurs.

[Caution]

(1) Be sure to turn ON the speed monitor mode signal (SOMD) after confirming deceleration of all axes. If the speed monitor mode signal (SOMD) is turned ON without deceleration, and the motor rotation speed exceeds the set speed, a speed monitor alarm will occur, resulting in an emergency stop state. Then, power of the drive section will be shut off.
(2) Turn OFF the speed monitor mode signal after confirming the door lock is OFF.
(3) Even if the speed monitor mode signal (SOMD) is turned ON while parameter error is output, speed monitoring is not initiated. Set the parameter with appropriate value, and then turn ON the speed monitor mode signal (SOMD).
(4) While the axis is being removed, it will be taken off from the watch list even if the parameters "#2313 SV113/bit F (safety observation function)" and "#13229 SP229/bit F" are ON.
However, removing all axes in the group which the door state signal is turned ON with "#2282 SV082/bit F-C (dis Digital signal input selection)" and "#13227 SP227/bit F-C (dis Digital signal input selection)" causes the emergency stop.
Do not remove the axis which the door state signal is to be input.

[Related signals]

(1) Speed monitor door open possible (SMDOEN: R96)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	HANDY TERMINAL DATA AREA TOP ADDRESS		R297

[Function]

Set the top address of the area in which data to be transmitted/received to/from the handy terminal is stored.

[Operation]

Set the CNC side R register top address corresponding to the handy terminal side D0 to "Handy terminal Data area top address (R297)", and set the number of registers to communicate into "Handy terminal Data valid number of registers (R298)".

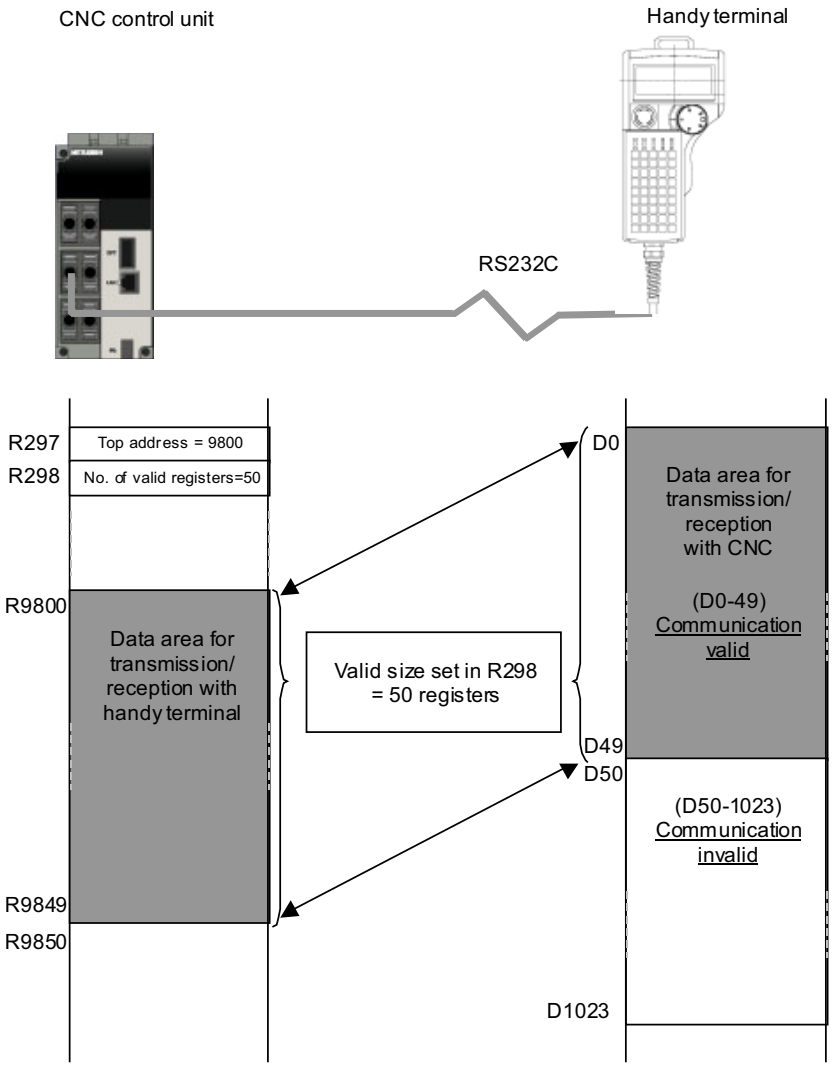
<Setting example>

The following is the setting value used for allocating the data from R9800 to R9849, the CNC side user area, by using 50 registers from D0 to D49 in the handy terminal side.

"9800 (0x2648) for "Handy terminal Data area top address (R297)"

"50 (0x32) for "Handy terminal Data valid number of registers (R298)"

Image drawing of internal register



[Related signals]

(1) Handy terminal key 1 to 45 (X1CD0 to X1CFC)
(2) Handle pulse encoder communication connector priority (Y70D)
(3) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(4) Handle/incremental feed magnification method selection (MPS: YC87)
(5) Handy terminal Data valid number of registers (R298)
(6) Handy terminal Cause of communication error (R299)
(7) 1st handle/incremental feed magnification (R2508, R2509)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	HANDY TERMINAL DATA VALID NUMBER OF REGISTERS		R298

[Function][Operation]

Set the number of valid registers from D0 within the handy terminal transmission/reception area (D0 to 1023).
With CNC, the range of handy terminal transmission/reception area is the number of registers set starting from "Handy terminal Data area top address (R297)".
Refer to the section on "Handy terminal Data top address" for details.

[Related signals]

(1) Handy terminal key 1 to 45 (X1CD0 to X1CFC)
(2) Handle pulse encoder communication connector priority (Y70D)
(3) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(4) Handle/incremental feed magnification method selection (MPS: YC87)
(5) Handy terminal Data area top address (R297)
(6) Handy terminal Cause of communication error (R299)
(7) 1st handle/incremental feed magnification (R2508,R2509)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	HANDY TERMINAL CAUSE OF COMMUNICATION ERROR		R299

[Function][Operation]

For details on communication error, refer to the table below.

Hexadecimal (HEX)	Decimal (DEC)	Details
0000	0	No error
FFFE	-2	Serial port in use
FFFC	-4	Timeout terminated
FFF9	-7	Serial driver forcibly terminated
FFF6	-10	Serial driver not ready (SIO cable is disconnected)
FFF1	-15	Parity error
FFEF	-17	Number of received characters over
FFEC	-20	Flaming error, H/W error
FC18	-1000	Handy terminal data area illegal (Out of user area)

[Related signals]

(1) Handy terminal key 1 to 45 (X1CD0 to X1CFC)
(2) Handle pulse encoder communication connector priority (Y70D)
(3) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(4) Handle/incremental feed magnification method selection (MPS: YC87)
(5) Handy terminal Data valid number of registers (R298)
(6) Handy terminal Cause of communication error (R299)
(7) 1st handle/incremental feed magnification (R2508, R2509)

Contact	Signal name	Signal abbreviation	Common for part systems
A	POWER CONSUMPTION COMPUTATION: CONSUMPTION OF DEVICES OTHER THAN DRIVE SYSTEM	NDPC	R304, 5

[Function]

This signal sets the power consumption of devices other than drive system.

[Operation]

This data is set with the PLC.

Setting size = 2 words, Setting unit = 1 (W), Setting range = -2147483648 to 2147483647 (W)

[Caution]

(Note 1) When the power is turned ON again, the state prior to the power ON is held.

(Note 2) The positive value represents power consumption and the negative value represents power regeneration.

[Related signals]

(1) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4:Y724 to 7)

(2) Power consumption computation: Accumulated consumption of devices other than drive system 1 to 4 (NDIPC1 to 4:R130 to 137)

Contact	Signal name	Signal abbreviation	Common for part systems
A	POWER CONSUMPTION COMPUTATION: DRIVE SYSTEM'S FIXED CONSUMPTION CORRECTION	DFPCC	R306, 7

[Function]

This signal sets the drive system's fixed consumption correction amount.

[Operation]

This data is set with the PLC.

With this data, the drive system's fixed consumption (base common #1464), which is set by parameter, can be adjusted by the ladder.

Setting size = 2 words, Setting unit = 1 (W), Setting range = -2147483648 to 2147483647 (W)

[Caution]

(Note 1) When the power is turned ON again, the state prior to the power ON is held.

(Note 2) The positive value represents power consumption and the negative value represents power regeneration.

[Related signals]

(1) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4:Y724 to 7)

(2) Power consumption computation: Present consumption of entire drive system (DTPPC:R120, 1)

(3) Power consumption computation: Accumulated consumption of entire drive system 1 to 4 (DTIPC1 to 4:R122 to 9)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Operator message I/F 1 to 4		R308 to R311

[Function]

Desired operator message prepared using PLC development tool (personal computer) can be displayed by setting value (binary code) to operator message interface file register (Rn). Operator message appears in ALARM DIAGNOSIS screen of the setting and display unit.

[Operation]

If table No. of previously prepared operator message table has been set to operator message interface file register,operator message can be displayed in ALARM DIAGNOSIS screen.Operator message can be cleared by setting "0" to operator message interface file register.

For details of operator messages, refer to the "PLC Programming Manual".

[Caution]

(1) Set the machine parameter PLC "#6450 bit 2" to 1 to display the operator messages.

(2) There are two types of interface for an operator message: type R which uses a file register (R) and type F which uses a temporary memory. The selection of type R or F is made by the machine parameter PLC "#6455 bit 3 ".

(3) Displaying an operator message does not cause any alarm on the controller side for type R or F. If the controller needs to be stopped, take appropriate action on the PLC side, including Automatic operation pause (*SP), Single block (SBK) and Interlock.

(4) R2560 and R308 cannot be used at a time. When you use R308, set "0" to R2560. R309 to R311 can be used regardless of the value of R2560.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	TOOL I/D R/W POT NO. DESIGNATION		R336

[Function]

Designate the number of the pot containing the tool No. of the information communicated with the tool ID controller.

[Operation]

(1) Designate the pot No. to store the tool information tool No. read in from the tool ID controller.

(2) Designate the pot No. containing the tool No. to write the tool information to the tool ID controller.

(3) Designate the pot No. containing the tool No. of which tool information is to be erased.

[Caution]

(1) Do not change the pot No. while communicating with the tool ID.

(2) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	LARGE DIAMETER TOOL INFORMATION		R337

[Function]

Information indicating whether the tool mounted on the spindle and standby tool are large diameter tools or not is set. (H: Spindle, L: Standby tool)

[Operation]

When the tool mounted on the spindle or standby tool is changed, "1" is set if the tool is a large diameter tool, and "0" is set if it is a normal tool, respectively.

If there is no tool mounted on the spindle or standby tool, H: spindle and L: standby tool will be cleared to "0".

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	TOOL WEIGHT (Spindle tool)		R338

[Function]

Weight of the tool mounted on the spindle is set.

[Operation]

When the tool mounted on the spindle is changed, the weight of the newly-mounted tool will be set.

If no tool is mounted on the spindle, this setting will be cleared to "0".

[Caution]

(1) Incremental unit for the weight is 0.1 kg.

(2) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	TOOL WEIGHT (Standby tool)		R339

[Function]

Weight of the standby tool is set.

[Operation]

When the standby tool is changed, the weight of newly-set standby tool will be set.

If there is no standby tool, this setting will be cleared to "0".

[Caution]

(1) Incremental unit for the weight is 0.1 kg.

(2) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	UNSET TOOL INFORMATION		R340

[Function]

Information indicating whether the tool mounted on the spindle and standby tool are unset tools (Note 1) or not is set. (H: Spindle, L: Standby tool)

[Operation]

When the tool mounted on the spindle or standby tool is changed, "1" is set if the tool is an unset tool, and "0" is set if the tool is set, respectively.

If there is no tool or standby tool mounted on the spindle, H: spindle and L: standby tool will be cleared to "0".

(Note 1) When changing the tool numbers in the ID label (when writing new tool information in the ID label), the tool must be set as an unset tool.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	REMOTE PROGRAM INPUT NO.		R352,3

[Function][Operation]

Refer to the section on "Remote program input start signal" (RPN) for the function and operation.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) In remote program input (X724)
(2) Remote program input completion (X725)
(3) Remote program input error (X726)
(4) Remote program input error information (R30)
(5) Remote program input start (RPN: Y76C)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	MACHINE MANUFACTURER MACRO PASSWORD NO		R354,5

[Function]

This function uses a password No. to prohibit editing and input/output of the user PLCs to prevent these user PLCs prepared by the machine manufacturer from being incorrect overwritten by the end user.
This function is an option.

[Operation]

The machine manufacturer's original password No. is registered in R354[L]/R355[H] with the user PLCs.
Set the password No. in the range of "2" to "99999999". "0" and "1" cannot be set. Note that if the R354/R355 value is "0" or "1", "5963" (default value) will be used as the password No.

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	DIRECT SCREEN SELECTION		R356 to 9

[Function]

This signal allows an automatic transition to the alarm display screen when an alarm occurs.

[Operation]

The following shows the descriptions of the registers R356 to R359.

Register No.	Description		Setting value
R356	Selection requirement/completion data		0: Initial state 1: Screen selection requirement 4: Screen selection completion 8: There is no application for the screen selection requirement
R357	Selection requirement	Function No.	Set "4" to transit to the alarm message display screen.
R358		Main menu No.	Set "6" to transit to the alarm message display screen.
R359		Sub menu No.	Set "1" to transit to the NC alarm display screen, "2" to the PLC alarm display screen.

(1) Confirm the initial state ("0") is set to R356, the selection requirement/completion data.

(2) Set the function No. (to R357), main menu No. (to R358) and sub menu No. (to R359). Then enter "1" to R356, the selection requirement/completion data.

(3) NC confirms the screen selection requirement and then sets the screen selection completion ("4") to the selection requirement/completion data (R356) to execute the screen transition.

(4) After the screen transition, user PLC confirms the screen selection completion ("4") in R356 and then initializes the data (to "0").

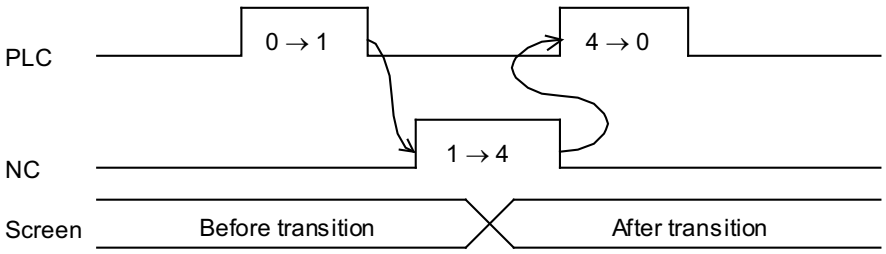
(Note 1) Setting the function No. is necessary. Without this No., the screen transition is not executed.

(Note 2) If the main menu No. has not been set (stays "0"), the function No. designates the screen transition. The screen transition is as same as when each function key has been pressed.

(Note 3) When the sub menu No. has been set, the main menu No. has also to be set. Unless the main menu is set, the transition is as same as when only the function No. is set.

(Note 4) When either the function No., main menu No. or sub menu No. is out of range, the screen transition is not executed. Then the selection requirement/completion data (R356) remains "1".

The timing chart of the selection requirement/completion data is shown below.



[Caution]

(1) This signal is used only for the transition to the alarm message display screen (NC/PLC message display screen) on the diagnosis screen. No other screen transition is executed by setting the screen selection data.

(2) The direct screen selection is not available with the display unit FCU7-DA201-xx or FCU7-DA211-xx.

(3) A failure of the screen transition does not display or set any error data, except for "8" in R356, which informs that no application software is found to make the direct screen selection requirement.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	USER LEVEL-BASED DATA PROTECTION: OPERATION LEVEL		R361

[Function]

This operation level signal switches the the protection level of various data.

The operation levels with R361 setting value are as follows.

Other than 1 to 3: Operation level 0
1 : Operation level 1
2 : Operation level 2
3 : Operation level 3

[Operation]

The operation level is switched depending on the state of the user level-based data protection operation level signal.

Various data is protected according to the operation level.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	HIGH-SPEED SIMPLE PROGRAM CHECK: TIME MEASUREMENT OUTPUT		R372,3

[Function]

This signal outputs an estimated machining time during the high-speed simple program check.

The unit of time output is [ms].

[Operation]

During the high-speed simple program check, this signal outputs the time from the start of the machining program execution until NC reset.

[Related signals]

(1) High-speed simple program check mode (SMLK:Y73E)
(2) High-speed simple program check mode ON (SMLKO:X712)
(3) High-speed simple program check: Time reduction coefficient (R378)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Manual arbitrary reverse run handle selection		R375

[Function]

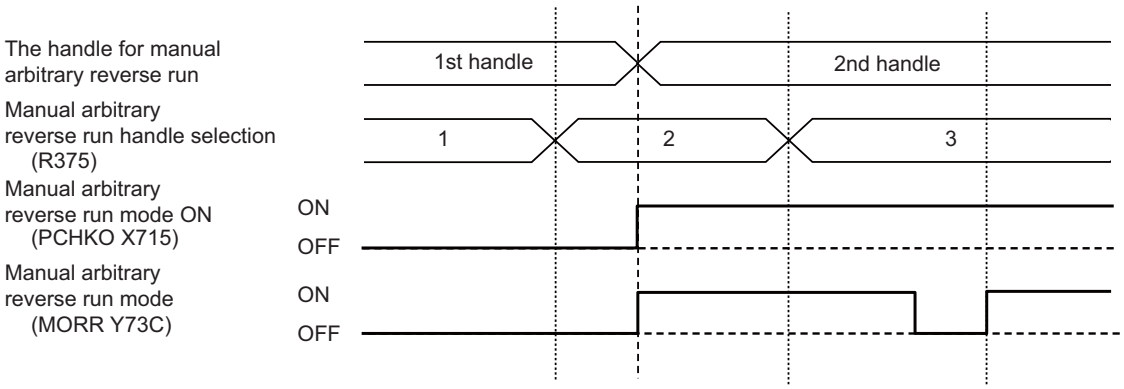
This signal is used to select which handle to use for the manual arbitrary reverse run.

[Operation]

The setting value "n" of this signal (R375) corresponds to the ordinal number of the handle. For example, when the setting value is "2", the machine follows the pulse input of the handle selected in "#1396 H2_pno (2nd handle selection)". The handle selected at the start of the manual arbitrary reverse run mode is used during the mode.

If any non-existent handle number is set in the manual arbitrary reverse run selection (R375) at the start of the mode, the 1st handle is used.

[Operation sequence]



[Related signals]

(1) Manual arbitrary reverse run mode ON (PCHKO:X715)
(2) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)
(3) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)
(4) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)
(5) Manual arbitrary reverse run mode (MORR:Y73C)
(6) Manual arbitrary reverse run speed selection (MORSP:Y73D)
(7) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)
(8) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY:YCF1)
(9) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG:YCFC)
(10) Manual arbitrary reverse run speed multiplier (R379)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	LOAD METER NAME DESIGNATION		R377

[Function] [Operation]

This signal switches the name of the load meter.

Refer to the section on "Load meter display" in the "PLC Programming Manual" for details.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	HIGH-SPEED SIMPLE PROGRAM CHECK: TIME REDUCTION COEFFICIENT		R378

[Function]

This signal reduces an execution time for the high-speed simple program check.

[Operation]

With the time reduction coefficient, the time for operations such as axis movement and dwell can be reduced.

If a machining program that requires T seconds for normal execution is performed while the "High-speed simple program check mode ON" (SMLKO:X712) is ON, the execution time is calculated by the following formula.

(1) When the "High-speed simple program check mode ON" (SMLKO:X712) is ON

Execution time = T x $(1/2^n)$ n: High-speed simple program check: Time reduction coefficient

(2) When the "High-speed simple program check mode ON" (SMLKO:X712) is OFF

Execution time = T

[Related signals]

(1) High-speed simple program check mode (SMLK:Y73E)

(2) High-speed simple program check mode ON (SMLKO:X712)

(3) High-speed simple program check: Time measurement output (R372,373)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	MANUAL ARBITRARY REVERSE RUN SPEED MULTIPLI-ER		R379

[Function]

This signal determines the speed for manual arbitrary reverse run when jog mode is selected for speed control during manual arbitrary reverse run.

[Operation]

If the "Manual arbitrary reverse run speed selection" (MORSP) signal turns ON, "#19007 program check constant" is used for speed control. If the "Manual arbitrary reverse run speed selection" (MORSP) signal is OFF, the command speed of the normal machining program is used.

The feedrate for manual arbitrary reverse run is controlled with the Manual arbitrary reverse run speed multiplier (R379) when operation is in jog mode. When in handle mode, the feedrate is controlled by the ratio of the handle pulses per time unit to "#19007 program check constant".

If the "Manual arbitrary reverse run speed selection" (MORSP) is OFF, the command speed of the normal machining program is used.

The speed used when the Manual arbitrary reverse run speed selection (MORSP) is ON

(1) When jog mode is selected:

Manual arbitrary reverse run speed = (Manual arbitrary reverse run speed multiplier ÷ Program check speed constant) × Command speed in the machining program

(2) When handle mode is selected:

Manual arbitrary reverse run speed = (amount of change of the handle pulses per time unit ÷ program check speed constant)× Command speed in machining program

- Rapid traverse override or cutting override can be exerted on the command speed in the machining program.
- Reverse motion is performed if the value of the manual arbitrary reverse run speed calculated with the above formula is a negative value.
- As the same rate of change of the manual arbitrary reverse run speed is applied to all part systems, synchronization of the part systems can be maintained. However, synchronization is not guaranteed when rapid traverse override or cutting override, which may cause a loss of synchronization, is used.
- If the value of the Manual arbitrary reverse run speed multiplier (R379) or the amount of change of handle pulses exceeds "#19007 program check constant", the value is clamped at the program check constant. The manual arbitrary reverse run speed never exceeds the command speed.

[Related signals]

(1) Manual arbitrary reverse run: Reverse run ON (MOREV:X716)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP:X74D)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG:X74E)
(4) Manual arbitrary reverse run mode (MORR:Y73C)
(5) Manual arbitrary reverse run speed selection (MORSP:Y73D)
(6) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD:Y761)
(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY YCF1)
(8) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG:YCFC)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: POSITION ERROR COMPENSATION SCALE, AND THE NUMBER OF TIMES OF COMPENSATIONS		R390

[Function]

Set the following: The scale applied to the position error compensation amount found for the first time after the G/B spindle synchronization: position error compensation (GBCMON) is turned ON, and how many times the position error compensation amount is refreshed.

[Operation]

	F	8	7	0
R390	(1)		(2)	

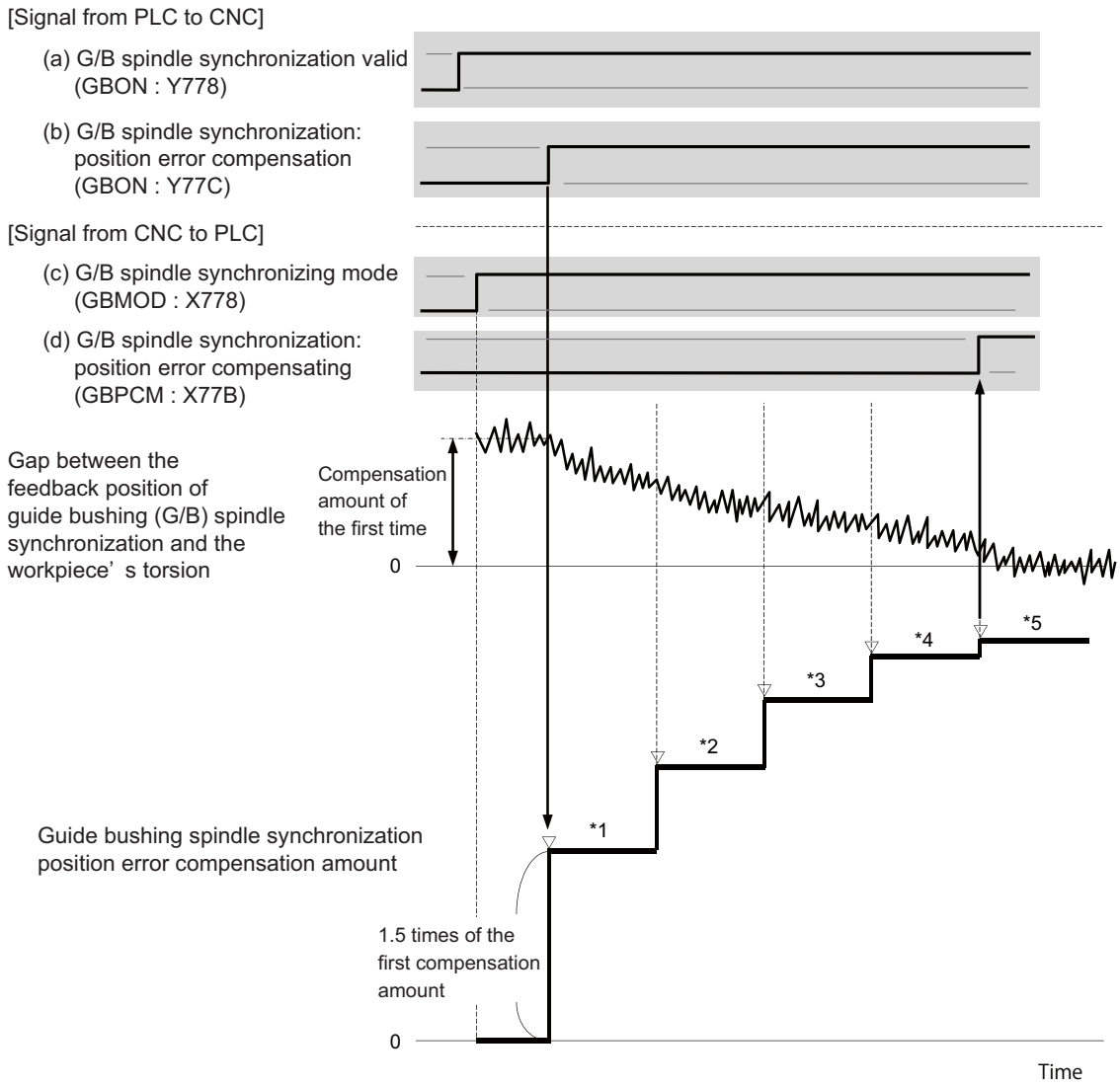
(1) Compensation scale applied to the first compensation
(2) The number of times of compensations

- In "Compensation scale applied to the first compensation", set the scale applied to the first position error compensation after turning on the G/B spindle synchronization: position error compensation (GBCMON). (Setting increment: 1/10 times)
  When 0 is set, the scale is once.
- In "The number of times of compensations", set how many times the G/B spindle synchronization: position error compensation (GBCMON) is refreshed after turning ON the G/B spindle synchronization position error compensation.
  When 0 is set, compensation is repeated by 16 times.

- Setting example

Compensation scale applied to the first compensation	The number of times of compensations	R390’s setting value
1.5 times	5 times	0F05 (HEX)

<Operation example: When R390 is set to "0F05">


[Signal from PLC to CNC]
(a) G/B spindle synchronization valid (GBON : Y778)
(b) G/B spindle synchronization: position error compensation (GBON : Y77C)
[Signal from CNC to PLC]
(c) G/B spindle synchronizing mode (GBMOD : X778)
(d) G/B spindle synchronization: position error compensating (GBPCM : X77B)
Gap between the feedback position of guide bushing (G/B) spindle synchronization and the workpiece’s torsion
Compensation amount of the first time
0
*1
*2
*3
*4
*5
Guide bushing spindle synchronization position error compensation amount
1.5 times of the first compensation amount
0
Time

<Refreshing the position error compensation amount after turning ON the G/B spindle synchronization position error compensation (GBCMON)>

When the G/B spindle synchronization position error compensation (GBCMON) is turned ON, the first position error compensation amount is measured, and compensation is carried out. (*1 in the figure above)

Next, the second position error compensation amount is measured, and compensation is carried out. (*2 in the figure above)

In the same manner, the third and fourth measurements are carried out.

The data of the fifth measurement are dealt as the final data to carry out the compensation. (*5 in the figure above)

The compensation scale is applied only to the first position error compensation.

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)
(2) G/B spindle synchronization: position error compensation (GBCMON:Y77C)
(3) G/B spindle synchronization: keep position error compensation amount (GBCMKP:Y77E)
(4) G/B spindle synchronization: position error compensating (GBPCM:X77B)
(5) G/B spindle synchronization: position error compensation amount (R465)

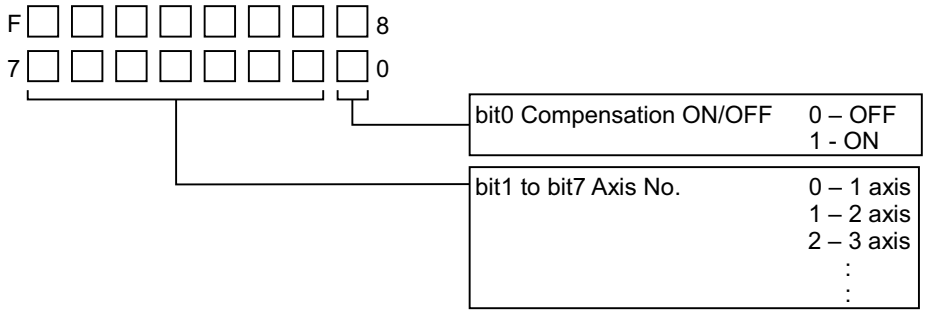
Con-tact	Signal name	Signal abbreviation	1stAX	2ndAX	3rdAX	4thAX
A	BALL SCREW THERMAL DISPLACEMENT COMPENSATION OFFSET AMOUNT n-TH AXIS		R400	R403	R406	R409
A	BALL SCREW THERMAL DISPLACEMENT COMPENSATION MAX. COMPENSATION AMOUNT n-TH AXIS		R401	R404	R407	R410
A	BALL SCREW THERMAL DISPLACEMENT COMPENSATION PART-SYSTEM, AXIS NO. n-TH AXIS		R402	R405	R408	R411

[Function]

These signals use R register as interface for PLC and NC. Up to 4 sets of axis can be set in R register, including axis No., offset amount, and max. compensation amount in one set.

[Operation]

(1) Part-system, axis No.(raxno): R402



(2) Offset amount (offset): R400
Set compensation amount for the farthest negative side (mdvno position) in the compensation range by using ladder, etc.

(3) Max. compensation amount (maxcmp): R401
Set compensation amount for the farthest positive side (pdvno position) in the compensation range by using ladder, etc. This compensation amount is a value using offset position as a criterion.

(4) Compensation amount (legcmp): R72
This is compensation amount for the current machine position set by NC.
Refer to the section on "Ball screw thermal displacement compensation Compensation amount" (R72) for details.

(Note 1) Raxno, offset, and maxcmp cannot be set from the program or NC screen. Set them in R register by using ladder, etc.

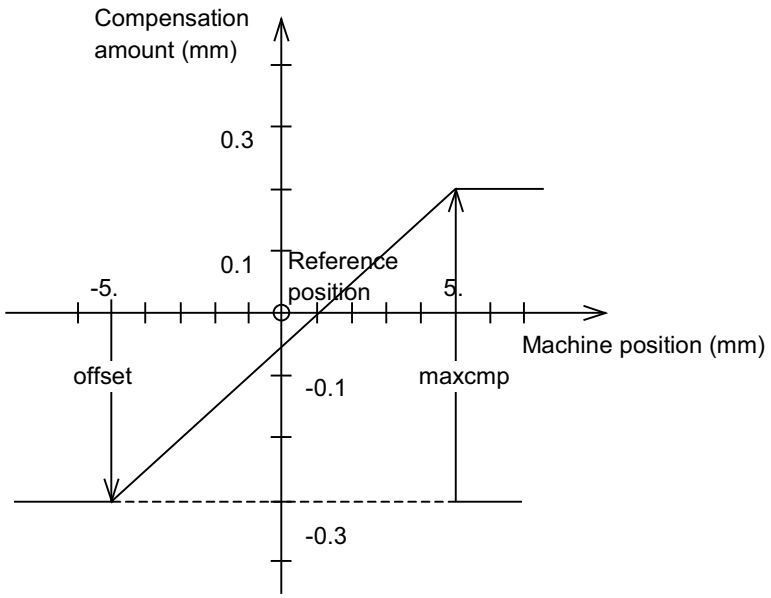
(Note 2) Unit for (2) to (4) above follows the setting of "#1006 Machine error compensation unit".
Parameters (backlash and pitch error compensation, etc.) regarding machine error compensation and external machine coordinate system compensation also follow this unit.

[Setting example]
When only the ball screw thermal displacement compensation is valid:

(Example 1)

Compensation range
cmpax X
drcax X
rdvno 4105
mdvno 4101
pdvno 4110
spcdv 1000

Compensation amount
offset -600
maxcmp 1000
raxno 1



When the ball screw thermal displacement compensation is used with the machine error compensation:

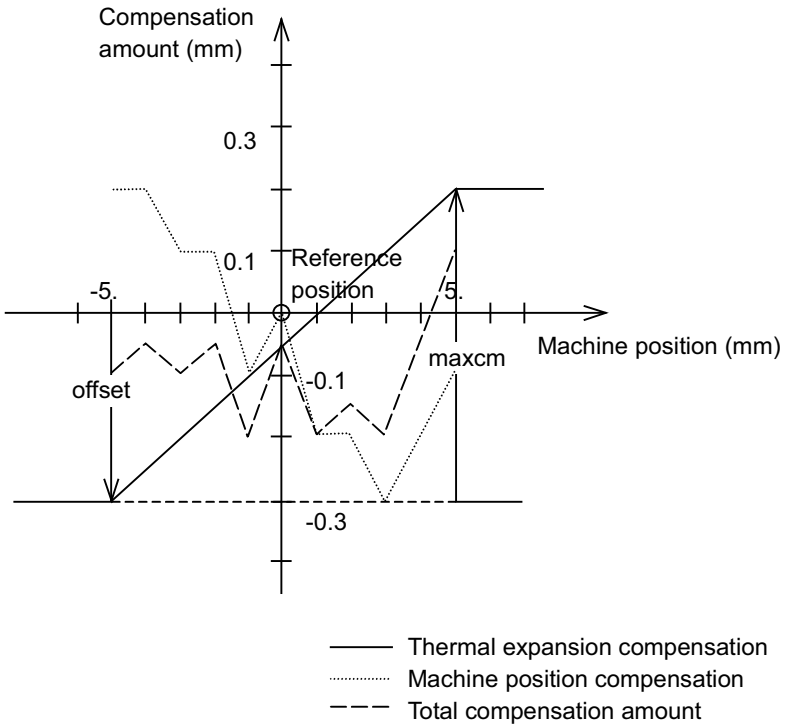
(Example 2)

Compensation range
cmpax X
drcax X
rdvno 4105
mdvno 4101
pdvno 4110
spcdv 1000

(Absolute value method)

Division No.	Compensation amount
1	200
2	200
3	100
4	100
5	-100
6	-200
7	-200
8	-300
9	-200
10	-100

Compensation amount
offset -600
maxcmp 1000
raxno 1



[Related signals]

(1) Ball screw thermal displacement compensation offset amount n-th axis (R400)
(2) Ball screw thermal displacement compensation Max. compensation amount n-th axis (R401)
(3) Ball screw thermal displacement compensation part-system, axis No. n-th axis (R402)
(4) Thermal expansion compensation amount (R72)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PLC AXIS CONTROL INFORMATION ADDRESS n-TH AXIS		R440 to 5

[Function]

The PLC axis control information address stores control information head R register for each PLC axis.

[Operation]

PLC axis control information address is designated by the following devices.

Device No.	Signal name
R440	PLC axis control information address 1st axis
R441	PLC axis control information address 2st axis
R442	PLC axis control information address 3st axis
R443	PLC axis control information address 4st axis
R444	PLC axis control information address 5st axis
R445	PLC axis control information address 6st axis

(Note) The following R registers can be used.
R8300 to R9799 (Battery backup area)
R9800 to R9899 (Non battery backup area)
R18300 to R19799 (Battery backup area)
R19800 to R19899 (Non battery backup area)
R28300 to R29799 (Battery backup area)
R29800 to R29899 (Non battery backup area)

[Related signals]

(1) PLC axis control buffering mode valid (PABMI:Y723)
(2) PLC axis control valid (PLCAEn:Y770 to Y775)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	PLC AXIS CONTROL BUFFERING MODE INFORMATION ADDRESS		R448

[Function][Operation]

The PLC axis control buffering mode information address stores PLC axis control buffering mode information.

[Related signals]

(1) PLC axis control buffering mode valid (PABMI:Y723)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	ENCODER 1 ARBITRARY PULSE 1		R456
A	ENCODER 1 ARBITRARY PULSE 2		R457
A	ENCODER 2 ARBITRARY PULSE 1		R458
A	ENCODER 2 ARBITRARY PULSE 2		R459

[Function]

Encoder pulse input used to be fixed to 1024 pulse input on the conventional analogue I/F. With this function, arbitrary pulse can be input by parameters set in R register. The maximum number of input pulse is 76800.

[Operation]

In order to input encoder arbitrary pulse, set the number of pulses necessary in R register. Switch encoder to be used by ON/OFF on the PLC device, and turn ON the arbitrary pulse input valid signal.

Turn OFF the arbitrary pulse input valid signal when using the conventional 1024 pulse encoder.

Device No.	Signal name	Details	
R456	Encoder 1 arbitrary pulse 1	This signal is selected when the encoder 1 arbitrary pulse selection (Y764) is OFF.	Input 1/2 of the number of pulses necessary for arbitrary pulse input with the encoder input 1. This number of pulses must be in hexadecimal but not in quad edge evaluation. The setting range is 0x200(512) to 0x9600(38400).
R457	Encoder 1 arbitrary pulse 2	This signal is selected when the encoder 1 arbitrary pulse selection (Y764) is ON.	
R458	Encoder 2 arbitrary pulse 1	This signal is selected when the encoder 2 arbitrary pulse selection (Y765) is OFF.	Input 1/2 of the number of pulses necessary for arbitrary pulse input with the encoder input 2. This number of pulses must be in hexadecimal but not in quad edge evaluation. The setting range is 0x200(512) to 0x9600(38400).
R459	Encoder 2 arbitrary pulse 2	This signal is selected when the encoder 2 arbitrary pulse selection (Y765) is ON.	

[Caution]

(1) Arbitrary pulse cannot be input from a bus-connected encoder.

(2) Input 1/2 of the number of pulses actually used with the encoder 1 arbitrary pulse 1 and 2 (R456 to 457), and the encoder 2 arbitrary pulse 1 and 2 (R458 to 459) in hexadecimal. If a different number of pulses is input, the speed at feed per rotation changes.

(3) When 0 to 0x1FF are set in R456 to R459, the encoder input pulse will be 1024 pulse input. When a value exceeding 0x9600 is set, it will be 76800 pulse input.

[Related signals]

(1) Encoder 1 arbitrary pulse selection (Y764)

(2) Encoder 2 arbitrary pulse selection (Y765)

(3) Encoder 1 arbitrary pulse valid (Y766)

(4) Encoder 2 arbitrary pulse valid (Y767)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: MAXIMUM RANGE OF THE RELATIVE POSITION ERROR		R460

[Function]

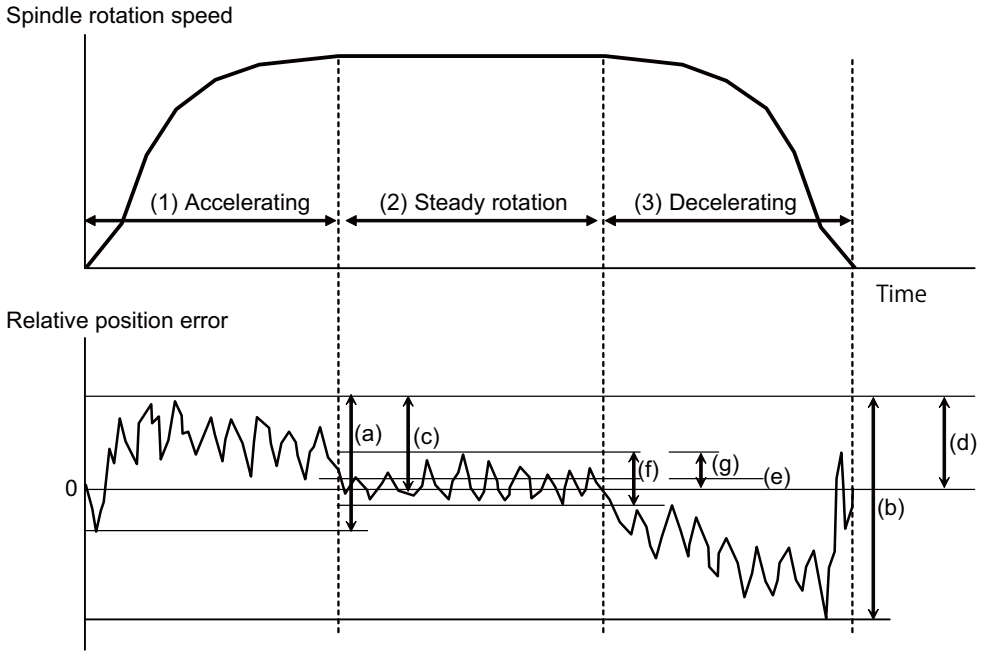
This signal outputs the maximum range of the relative position error during acceleration/deceleration after the spindle motor completes the acceleration/deceleration.

[Operation]

During guide bushing spindle (G/B) synchronization mode, the following five values are calculated based on the relative position error between the reference spindle and the guide bushing spindle, and they are output to the registers when the state changes between the acceleration/deceleration state and the steady state. (Unit is pulse, 1pulse ≒ 0.088°)

(1) Maximum range of the relative position error during acceleration/deceleration
(2) Maximum value of the relative position error during acceleration/deceleration
(3) Maximum range of the relative position error during the steady state
(4) Maximum value of the relative position error during the steady state
(5) Average value of the relative position error during the steady state

This sampling is constantly carried out during the guide bushing spindle synchronization mode. It stops when the guide bushing spindle synchronization mode is canceled.



R460	Maximum range ((a) above) of the relative position error is written after the spindle motor completes acceleration.
	Maximum range ((b) above) of the relative position error is written after the spindle motor decelerates and stops.
R461	Maximum value ((c) above) of the relative position error is written after the spindle motor completes acceleration.
	Maximum value ((d) above) of the relative position error is written after the spindle motor.
R462	Average value ((e) above) of the relative position error is written after the spindle motor finishes steady rotation.
R463	Maximum range ((f) above) of the relative position error is written after the spindle motor finishes steady rotation.
R464	Maximum value ((g) above) of the relative position error is written after the spindle motor finishes steady rotation.

(Note 1) The relative position error is calculated by "Reference spindle's feedback position – guide bushing spindle's feedback position".

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: MAXIMUM VALUE OF THE RELATIVE POSITION ERROR		R461

[Function]

This signal outputs the maximum value of the relative position error after the spindle motor completes the acceleration/ deceleration.

[Operation]

Refer to R460 (G/B spindle synchronization: Maximum range of the relative position error) .

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)

(2) G/B spindle synchronization: Maximum range of the relative position error (R460)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: AVERAGE VALUE OF THE RELATIVE POSITION ERROR DURING THE STEADY STATE		R462

[Function]

This signal outputs the average value of the relative position error during steady rotation after the spindle motor completes steady rotation.

[Operation]

Refer to R460 (G/B spindle synchronization: Maximum range of the relative position error).

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)

(2) G/B spindle synchronization: Maximum range of the relative position error (R460)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION : MAXIMUM RANGE OF THE RELATIVE POSITION ERROR DURING THE STEADY STATE		R463

[Function]

This signal outputs the maximum range of the relative position error during steady rotation after the spindle motor completes steady rotation.

[Operation]

Refer to R460 (G/B spindle synchronization: Maximum range of the relative position error).

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)

(2) G/B spindle synchronization: Maximum range of the relative position error (R460)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: MAXIMUM VALUE OF THE RELATIVE POSITION ERROR DURING THE STEADY STATE		R464

[Function]

This signal outputs the maximum value of the relative position error during steady rotation after the spindle motor completes steady rotation.

[Operation]

Refer to R460 (G/B spindle synchronization: Maximum range of the relative position error).

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)

(2) G/B spindle synchronization: Maximum range of the relative position error (R460)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: POSITION ERROR COMPENSATION AMOUNT		R465

[Function]

This signal outputs the position error compensation amount in the guide bushing (G/B) spindle synchronization position error compensation state.

[Operation]

When the G/B spindle synchronization: position error compensation (GBCMON) is turned ON, this signal outputs the position error compensation amount during the guide bushing spindle synchronization position error compensation. (Unit is pulse, 1pulse ≒ 0.088°)

When the guide bushing spindle synchronization position error compensation is finished, this signal becomes "0".

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)
(2) G/B spindle synchronization: position error compensation (GBCMON:Y77C)
(3) G/B spindle synchronization: keep position error compensation amount (GBCMKP:Y77E)
(4) G/B spindle synchronization: position error compensation scale and the number of times of compensations (R390)
(5) G/B spindle synchronization: position error compensating (GBPCM:X77B)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	G/B SPINDLE SYNCHRONIZATION: PHASE SHIFT AMOUNT		R466

[Function]

This signal outputs the phase error (relative position) of the reference spindle and guide bushing (G/B) spindle saved when the G/B spindle synchronization: phase memory (GBPHM) was turned ON.

[Operation]

This signal displays the phase error (relative position) of the reference spindle and guide bushing spindle saved when the G/B spindle synchronization: phase memory (GBPHM) was turned ON during guide bushing spindle synchronization. (Unit is pulse, 1pulse ≒ 0.088°)

When guide bushing spindle synchronization is canceled, this signal becomes "0".

[Related signals]

(1) G/B spindle synchronization valid (GBON:Y778)
(2) G/B spindle synchronization: phase memory (GBPHM:Y77B)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus BLOCK 1 TRANSFER POSITION		R470

[Function]

This signal sets the head position for the transfer block 1 between the Modbus device and the file register.

[Operation]

Transfer from Modbus device to the file register is executed in the transfer block 1 every time the PLC scans.

The head position for the transfer is set with word unit.

The setting range is 0 to 199. Transfer is not executed if the value other than the setting range is set.

It is initialized to "0" when the power is turned ON. Set the value at the first scan of the sequence.

If the value is changed, it will take effect immediately.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus BLOCK 1 NUMBER OF TRANSFERS		R471

[Function]

This signal sets the number of words for the transfer block 1 to transfer between Modbus device and file register

[Operation]

Transfer from Modbus device to the file register is executed in the transfer block 1 every time the PLC scans.
Set the number of words to transfer.
The setting range is 0 to 200. If the value other than the setting range is set, it will be handled as "0".
It is initialized to "0" when the power is turned ON. Set the value at the first scan of the sequence.
If the value is changed, it will take effect immediately.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus BLOCK 2 TRANSFER POSITION		R472

[Function]

This signal sets the head position for the transfer block 2 between the Modbus device and the file register.

[Operation]

Transfer from Modbus device to the file register is executed at a constant frequency in the transfer block 2.
The head position for the transfer is set with word unit.
The setting range is 0 to 199. Transfer is not executed if the value other than the setting range is set.
It is initialized to "0" when the power is turned ON. Set the value at the first scan of the sequence.
If the value is changed, it will take effect immediately.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus BLOCK 2 NUMBER OF TRANSFERS		R473

[Function]

This signal sets the number of words for the transfer block 2 to transfer between Modbus device and file register

[Operation]

Transfer from Modbus device to the file register is executed at a constant frequency in the transfer block 2.
Set the number of words to transfer.
The setting range is 0 to 200. If the value other than the setting range is set, it will be handled as "0".
It is initialized to "0" when the power is turned ON. Set the value at the first scan of the sequence.
If the value is changed, it will take effect immediately.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus BLOCK 3 TRANSFER POSITION		R474

[Function]

This signal sets the head position for the transfer block 3 between the Modbus device and the file register.

[Operation]

Transfer from the file register to Modbus device is executed in the transfer block 3 every time the PLC scans.
The head position for the transfer is set with word unit.
The setting range is 0 to 199. Transfer is not executed if the value other than the setting range is set.
It is initialized to "0" when the power is turned ON. Set the value at the first scan of the sequence.
If the value is changed, it will take effect immediately.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus BLOCK 3 NUMBER OF TRANSFERS		R475

[Function]

This signal sets the number of words for the transfer block 3 to transfer between Modbus device and file register

[Operation]

Transfer from the file register to Modbus device is executed in the transfer block 3 every time the PLC scans.
Set the number of words to transfer.
The setting range is 0 to 200. If the value other than the setting range is set, it will be handled as "0".
It is initialized to "0" when the power is turned ON. Set the value at the first scan of the sequence.
If the value is changed, it will take effect immediately.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus BLOCK 4 TRANSFER POSITION		R476

[Function]

This signal sets the head position for the transfer block 4 between the Modbus device and the file register.

[Operation]

Transfer from the file register to Modbus device is executed at a constant frequency in the transfer block 4.
The head position for the transfer is set with word unit.
The setting range is 0 to 199. Transfer is not executed if the value other than the setting range is set.
It is initialized to "0" when the power is turned ON. Set the value at the first scan of the sequence.
If the value is changed, it will take effect immediately.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus BLOCK 4 NUMBER OF TRANSFERS		R477

[Function]

This signal sets the number of words for the transfer block 4 to transfer between Modbus device and file register.

[Operation]

Transfer from the file register to Modbus device is executed at a constant frequency in the transfer block 4.
Set the number of words to transfer.
The setting range is 0 to 200. If the value other than the setting range is set, it will be handled as "0".
It is initialized to "0" when the power is turned ON. Set the value at the first scan of the sequence.
If the value is changed, it will take effect immediately.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus TRANSFER CYCLE		R478

[Function]

This signal sets the transfer cycle between the transfer block 2 and the transfer block 4.

[Operation]

The table below shows the constant cycle to execute the transfer with the setting value.

This setting is common for the transfer block 2 and the transfer block 4.

If the value other than the setting range is set, it will be handled as "0".

It is initialized to "0" when the power is turned ON. Set the value at the first scan of the sequence.

If the value is changed, it will take effect immediately.

Setting value	Transfer cycle
0	A transfer is executed every time the PLC scans.
1	A transfer is executed every two PLC scans.
2	Transfer is executed every three PLC scans.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Modbus TIME-OUT PERIOD 1		R479

[Function]

This signal sets the time-out period to detect the Modbus/TCP communication is aborted.

[Operation]

The setting range is 0 to 65535 and the setting unit is 0.1 [sec.].

If "0" is set, the time-out detection is disabled.

This setting time is valid for Modbus/TCP communication only. The time-out period of the I0 parameter is used for Modbus/RTU communication.

It is initialized to "0" when the power is turned ON.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	1ST CUTTING FEEDRATE OVERRIDE		R2500	R2700	R2900	R3100	R3300	R3500	R3700	R3900

[Function]

When "Cutting feedrate override method selection" (FVS) is set to "file register method", override (0 to 300%, 1% increment) can be exerted on the cutting feedrate. Desired value is set to file register (R) in binary code.

[Operation]

When override is exerted to the preset feedrate, the true feedrate is the product obtained by multiplying the preset feedrate by the specified override ratio (provided that "2nd cutting feedrate override" is not valid).

The override ratio is fixed to 100%, irrespective of "1st feedrate override" setting, under the following condition:

(1) "Override cancel" (OVC) signal is ON.
(2) During tapping in fixed cycle.
(3) During TAPPING mode.
(4) During thread cutting.

(Note) Only when override setting is 0%, override is exerted even on rapid traverse speed in automatic operation. That is, cutting feed as well as rapid traverse stop if the 1st feedrate override is set to 0% during automatic operation. When override setting is 0%, "M01 OPERATION ERROR" appears in the alarm display section of setting and display unit, and "M01 OPERATION ERROR 0102" in the ALARM DIAGNOSIS display.

[Related signals]

(1) Cutting feedrate override code m (*FV1 to 16: YC60)
(2) Cutting feedrate override method selection (FVS: YC67)
(3) 2nd cutting feedrate override valid (FV2E: YC66)
(4) 2nd cutting feedrate override (R2501)

(Note) For relationship among these signals, refer to the description the cutting feedrate override.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	2ND CUTTING FEEDRATE OVERRIDE		R2501	R2701	R2901	R3101	R3301	R3501	R3701	R3901

[Function]

When the "2nd cutting feedrate override valid" function (FV2E) is used, another override can be exerted on "Cutting feedrate override code" (*FV1 to 16), or "1st cutting feedrate override" when the "Cutting feedrate override method selection" (FVS) is set to file register method. The 2nd feedrate override can be set within range from 0% to 327.67% with 0.01% increment. The value is set in the file register (R) in binary.

[Operation]

When this override function is used, the true feedrate is the product obtained by multiplying commanded feedrate (F) by "1st cutting feedrate override" ratio and "2nd cutting feedrate override" ratio.

Since the least increment of 2nd feedrate override is 0.01%, override setting "10000" corresponds to 100%.

The override ratio is fixed to 100%, irrespective of "1st cutting feedrate override" or "2nd cutting feedrate override" setting, under the following condition:

(1) "Override cancel" (OVC) signal is ON.
(2) During tapping in fixed cycle.
(3) During TAPPING mode.
(4) During thread cutting.

(Note) Only when the 1st cutting feedrate override or 2nd cutting feedrate override is 0% or both of them are 0%, override is exerted even on rapid traverse speed in automatic operation. That is, cutting feed as well as rapid traverse stop if the 1st override feedrate is set to 0% during automatic operation. When override setting is 0%, "M01 OPERATION ERROR" appears in the alarm display section of setting and display unit, and "M01 OPERATION ERROR 0102" in the ALARM DIAGNOSIS display.

[Related signals]

(1) Cutting feedrate override code m (*FV1 to 16: YC60)
(2) Cutting feedrate override method selection (FVS: YC67)
(3) 2nd cutting feedrate override valid (FV2E: YC66)
(4) 1st cutting feedrate override (R2500)

(Note) For relationship among these signals, refer to the description about the cutting feedrate override.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	RAPID TRAVERSE OVERRIDE		R2502	R2702	R2902	R3102	R3302	R3502	R3702	R3902

[Function]

When "Rapid traverse override method selection" signal (ROVS) is set to "file register method", override can be exerted, besides the code method override (ROV1, ROV2), by setting within the range of 0% to 100% by 1% increments. The value is set in the file register (R) in binary.

[Operation]

During rapid traverse in the automatic or manual operation, the actual feedrate will be the result of multiplying the rapid traverse speed set in a parameter by this override ratio.

(Note 1) The override will be clamped at 100%.

(Note 2) The "M01 Rapid traverse override zero 0125" will occur if the override value is 0%.

[Related signals]

(1) Rapid traverse override code 1,2 (ROV1, ROV2: YC68, YC69)

(2) Rapid traverse override method selection (ROVS: YC6F)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CHOPPING OVERRIDE	CHPOV	R2503	R2703	R2903	R3103	R3303	R3503	R3703	R3903

[Function]

The chopping override can be set in the range between 0 and 100% .

The value is set directly in the R register for chopping override. (The code method setting is not available.)

The data is set in R2503.

[Operation]

(1) Only the chopping override is valid for the chopping operation.When rapid traverse override valid is commanded from the PLC window, the rapid traverse override can be validated for the rapid traverse between the basic position and upper dead center point.The rapid traverse override can be set with either the code method (1, 25, 50, 100%) or the file register (value setting) method (0 to 100%, 1% increment).

(2) The chopping override is set between 0 and 100%.Select either "1 %" or "0.01%" by the control data for the setting unit.If a value outside the range from 0 to 100% is set, the override will be clamped at 100%.

(3) Set the data with one command.

(4) If the "Chopping override" signal is set to "0", "M01 OPERATION ERROR 0150" will occur.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL FEEDRATE		R2504,5	R2704,5	R2904,5	R3104,5	R3304,5	R3504,5	R3704,5	R3904,5

[Function]

When "Manual feedrate method selection" signal (JVS) is set to "file register method", feedrate can be specified, besides code method (*JV1 to 16) setting, by setting desired feedrate ratio manually. The value is set in the file register (R) in binary.

[Operation]

This mode of feedrate setting can be used in JOG feed, incremental feed, reference position return feed and manual arbitrary feed mode. For JOG, incremental and reference position return mode, "Rapid traverse speed" (RT) signal should be OFF. For manual arbitrary feed mode, "Manual arbitrary feed EX.F/MODAL.F" signal (CXS3) should be OFF. Feedrate specified in this mode can be applied to feed motion in dry run (automatic operation).

The use of this signal is conditioned as follows:

(1) When "Manual override method selection" signal (OVSL) is OFF, the originally set feedrate is applied.

(2) When "Manual override method selection" signal (OVSL) is ON, the actual feedrate can be obtained by multiplying the feedrate specified by the 1st/2nd cutting feed override value.

(3) Manual feedrate is set to file registers Rn and Rn+1. The feedrate depends on "Feedrate least increment code 1,2" (PCF1, PCF2) as listed below.

PCF2	PCF1	Least increment (mm/min or inch/min)	Operation
0	0	10	10mm/min (inch/min) when "1" is set in file registers.
0	1	1	1mm/min (inch/min) when "1" is set in file registers.
1	0	0.1	0.1mm/min (inch/min) when "1" is set in file registers.
1	1	0.01	0.01mm/min (inch/min) when "1" is set in file registers.

(4) Feedrate clamp (max. feedrate) depends on setting of axis parameter (cutting feedrate clamp) when "Rapid traverse" signal (RT) is OFF.

(Note 1) During incremental feed mode, the true feedrate does not change even when the manual feedrate setting is changed while feed motion is going on.

(Note 2) As for file registers (Rn and Rn+1), Rn is of low order.
Of the file registers Rn and Rn+1 to designate the feedrate, if the value is 2-bytes (one word), the high-order side does not need to do anything.

[Related signals]

(1) Manual feedrate code m (*JV1 to *JV16: YC70 to YC74)

(2) Manual feedrate method selection (JVS: YC77)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL FEEDRATE B		R2506,7	R2706,7	R2906,7	R3106,7	R3306,7	R3506,7	R3706,7	R3906,7

[Function][Operation]

Designate the manual feedrate for the axis selected with the manual feedrate B valid signal.

[Caution]

(1) The speed designated with this register is valid for the manual feedrate of an axis for which the manual feedrate B valid signal is valid.

(2) Cutting override and manual override are invalid for this register's speed.

(3) This register is not related to the dry run speed.

(4) A binary value is directly set for this register. The setting unit is 0.01mm/min (°/min).

(5) This signal is a register common for all axes.

[Related signals]

(1) Manual feedrate B valid (FBEn:Y940 to 947)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	1ST HANDLE/INCREMENTAL FEED MAGNIFICATION		R2508,9	R2708,9	R2908,9	R3108,9	R3308,9	R3508,9	R3708,9	R3908,9

[Function]

By selecting the handle/incremental feed magnification method (MPS), an arbitrary magnification can be designated separately from magnification set by regular code method. Magnification value (multiplier) is set in file register (R) in binary.

When the "handle/incremental feed magnification method selection" signal (MPS) is ON, this magnification factor is applied for the hand pulse from handy terminal.

[Operation]

Magnification is applied to amount of feed per pulse in handle feed mode (output from manual pulse generator), or to amount of feed per signal in incremental feed mode (+J1, -J1, etc.).

When multiplier is "500" and one pulse is given in handle feed mode, for example, 500μm of feed motion occurs. When multiplier is "30000" and one feed command signal is given in incremental feed mode, 30mm of feed motion occurs (time constant for feed motion is equal to time constant for rapid traverse or step).

(Note 1) Change of magnification setting during feed motion is ignored.

(Note 2) Since considerably large magnification can be used, the signal should be used carefully.

[Related signals]

(1) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)

(2) Handle/Incremental feed magnification method selection (MPS: YC87)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	2ND HANDLE FEED MAGNIFICATION		R2510,1	R2710,1	R2910,1	R3110,1	R3310,1	R3510,1	R3710,1	R3910,1
A	3RD HANDLE FEED MAGNIFICATION		R2512,3	R2712,3	R2912,3	R3112,3	R3312,3	R3512,3	R3712,3	R3912,3

[Function]

By selecting the handle/incremental feed magnification method, an arbitrary magnification can be designated separately from magnification set by regular code method. Magnification value (multiplier) is set in file register (R) in binary.

Arbitrary magnification, when using 2nd and 3rd handles, is designated here.

[Operation]

When 1 pulse is sent by 2nd or 3rd handle, its feed amount conforms to this feed magnification.

For example, when 1 pulse is sent in handle mode with magnification set at "500", its feed amount will be 500μm.

(Note 1) Changing magnification during feed motion is invalid.

(Note 2) Considerably large magnification can be set in the handle/incremental feed magnification method. Pay extra attention when setting magnification.

[Related signals]

(1) Handle/incremental feed magnification code m (MP1,MP2,MP4:YC80,C81,C82)

(2) 1st handle/incremental feed magnification (R2508)

(3) Handle/incremental feed magnification method selection (MPS:YC87)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MACHINE STATUS ANIMATED WARNING DISPLAY TYPE		R2517	R2717	R2917	R3117	R3317	R3517	R3717	R3917

[Function]

Set an icon displayed with the machine status animation.

[Operation]

When the setting is "0": Icon not displayed

When the setting is "1": Spindle rotation direction icon

When the setting is "2": Coolant icon

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	PLC INTERRUPT PROGRAM NO.		R2518,9	R2718,9	R2918,9	R3118,9	R3318,9	R3518,9	R3718,9	R3918,9

[Function]

Set the program No. to execute the PLC interrupt.

[Operation][Caution]

Refer to "PLC interrupt (PIT)" for details of PLC interrupt operation.

[Related signals]

(1) PLC interrupt (PIT:YC2E)

(2) In PLC interrupt (PCINO:XC35)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD METER DISPLAY INTERFACE 1,2		R2520 to 3	R2720 to 3	R2920 to 3	R3120 to 3	R3320 to 3	R3520 to 3	R3720 to 3	R3920 to 3

[Function][Operation]

The load meter can be displayed on the coordinate value screen by just setting a value in the corresponding file register.
Refer to the section on "Load meter display" in the "PLC Programming Manual" for details.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL FEEDRATE B OVERRIDE		R2524	R2724	R2924	R3124	R3324	R3524	R3724	R3924

[Function]

Override for manual feedrate B valid axis is set.

[Operation]

The override set with this register will be valid for the axis selected with the manual feedrate B valid signal.
This register can be set within the range of 0 to 200% in 0.01% increment.
If a value larger than 200%(setting value=20000) is set, the value is regarded as 200% when operating.
This register is common for axes.

[Caution]

(1) When the manual feedrate B override commanded by the user PLC is "0"%, even if the feed axis selection signal for the axis selected by the manual feedrate B valid signal is turned ON, an error occurs and the axis will not move.

(2) For a linear axis, the manual feedrate B surface speed control is not valid. However, the manual feedrate B override is valid.

(3) In order to use manual feedrate B override, the manual feedrate B surface speed control option is required.

[Related signals]

(1) Manual feedrate B valid (FBEn:Y940 to Y947)

(2) Manual feedrate B surface speed control valid (YC7D)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED 1ST AXIS TRAVEL AMOUNT		R2544,5	R2744,5	R2944,5	R3144,5	R3344,5	R3544,5	R3744,5	R3944,5

[Function]

This data specifies the travel amount or positioning point in manual arbitrary feed mode.

[Operation]

"Manual arbitrary feed 1st axis travel amount" is for the axis whose number is specified by "Manual arbitrary feed 1st axis selection code m" (CX11 to 116: YCA0 to YCA4).

"Manual arbitrary feed 1st axis travel amount" means differently depending on the statuses of the "Manual arbitrary feed MC/WK (CXS5)" and "Manual arbitrary feed ABS/INC (CXS6)" signals.

(1) When the Manual arbitrary feed ABS/INC (CXS6) signal is ON:
"Manual arbitrary feed 1st axis travel amount" specifies travel amount (increment).

(2) When the "Manual arbitrary feed ABS/INC (CXS6)" signal is OFF, it depends on the status of the "Manual arbitrary feed MC/WK (CXS5)" signal as follows:

(a) When the "Manual arbitrary feed MC/WK (CXS5)" signal is OFF:
"Manual arbitrary feed 1st axis travel amount" specifies a coordinate position (positioning point) of the machine coordinate system.

(b) When the "Manual arbitrary feed MC/WK (CXS5)" signal is ON:
"Manual arbitrary feed 1st axis travel amount" specifies a coordinate position (positioning point) of the modal workpiece coordinate system.

"Manual arbitrary feed 1st axis travel amount" is written in binary notation with a sign. The unit of the specified value matches that of data entered.

(Ex.)When (R2545, R2544)=1 is specified in micrometer system, axis motion is 1μm (at incremental specification).

[Caution]

"Manual arbitrary feed 1st axis travel amount" forms a data item by R2544 and R2545 or R2744 and R2745. Handle negative data carefully.

[Related signals]

For related signals, see the descriptions on "Manual arbitrary feed mode (PTP: YC03)".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED 2ND AXIS TRAVEL AMOUNT		R2548,9	R2748,9	R2948,9	R3148,9	R3348,9	R3548,9	R3748,9	R3948,9

[Function][Operation]

"Manual arbitrary feed 2nd axis travel amount" is for the axis whose number is specified by "Manual arbitrary feed 2nd axis selection code m (CX21 to CX216)".

The other conditions are the same as for "Manual arbitrary feed 1st axis travel amount" explained in the previous section.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MANUAL ARBITRARY FEED 3RD AXIS TRAVEL AMOUNT		R2552,3	R2752,3	R2952,3	R3152,3	R3352,3	R3552,3	R3752,3	R3952,3

[Function][Operation]

"Manual arbitrary feed 3rd axis travel amount" is for the axis whose number is specified by "Manual arbitrary feed 3rd axis selection code m (CX31 to CX316)."

The other conditions are the same as for "Manual arbitrary feed 1st axis travel amount" explained in the previous section.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	ALARM MESSAGE I/F 1 to 4		R2556 to 9	R2756 to 9	R2956 to 9	R3156 to 9	R3356 to 9	R3556 to 9	R3756 to 9	R3956 to 9

[Function]

Desired alarm messages prepared using PLC development tool (personal computer) can be displayed in ALARM DIAGNOSIS screen of the setting and display unit by setting values (binary code) to alarm interface file registers (Rn, Rn+1, Rn+2, Rn+3).

[Operation]

If table No. of previously prepared alarm message table has been set to alarm interface file registers, alarm message, if alarm occurs, can be displayed in ALARM DIAGNOSIS screen.Maximum 4 alarm messages can be displayed at the same time.

Alarm message can be cleared by setting "0" to alarm interface file registers.

For details of alarm message display, refer to the "PLC Programming Manual".

[Caution]

(1) Set machine parameter PLC "#6450 bit 0" to 1 to display the alarm messages.

(2) For alarm message interface, file register (R method) or temporary storage (F method) can be used. The selection is made with machine parameter PLC "#6450 bit 1".

(3) In both R method (file register) and F method (temporary storage), alarm does extend to the controller.When it is desirous to stop controller operation according to alarm type, signals such as "Automatic operation "pause" command" (*SP) signal, "Single block" (SBK) signal and "Interlock" signal should be processed on the PLC side.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	OPERATOR MESSAGE I/F		R2560	R2760	R2960	R3160	R3360	R3560	R3760	R3960

[Function]

Desired operator message prepared using PLC development tool (personal computer) can be displayed by setting value (binary code) to operator message interface file register (Rn). Operator message appears in ALARM DIAGNOSIS screen of the setting and display unit.

[Operation]

If table No. of previously prepared operator message table has been set to operator message interface file register, operator message can be displayed in ALARM DIAGNOSIS screen.Operator message can be cleared by setting "0" to operator message interface file register.

For details of operator messages, refer to the "PLC Programming Manual".

[Caution]

(1) Set the machine parameter PLC "#6450 bit 2" to 1 to display the operator messages.

(2) There are two types of interface for an operator message: type R which uses a file register (R) and type F which uses a temporary memory. The selection of type R or F is made by the machine parameter PLC "#6455 bit 3 ".

(3) Displaying an operator message does not cause any alarm on the controller side for type R or F. If the controller needs to be stopped, take appropriate action on the PLC side, including Automatic operation pause (*SP), Single block (SBK) and Interlock.

(4) R2560 and R308 cannot be used at a time. When you use R308, set "0" to R2560. R309 to R311 can be used regardless of the value of R2560.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SEARCH & START PROGRAM NO.		R2562,3	R2762,3	R2962,3	R3162,3	R3362,3	R3562,3	R3762,3	R3962,3

[Function]

The No. of the program to be searched with search & start is designated.

[Operation]

Set the No. of the program to be searched with search & start with a binary value.

(Note 1) The program No. must be set before the "Search & start" signal is input.

(Note 2) If a machining program No. is not designated or if an illegal No. is designated, and error signal will be output when the search operation is executed.

[Related signals]

(1) Search & start (RSST: YC31)

(2) Search & start Error (SEE: XC8A)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	ENCODER SELECTION		R2567	R2767	R2967	R3167	R3367	R3567	R3767	R3967

[Function]

Using a binary setting, select which spindle's encoder feedback to use.

0: 1st spindle 1: 2nd spindle 2: 3rd spindle 3: 4th spindle 4: 5th spindle 5: 6th spindle 6: 7th spindle 7: 8th spindle

(Note) If a setting exceeds the number of connected spindles, it will be interpreted that a selection has not been made.

[Related signals]

(1) Spindle selection (SWS: X18A8)

(2) Spindle command selection (SLSP: R7002)

(3) Spindle stop (SSTP: Y1894)

(4) Spindle enable (ENB: X18A0)

(5) Spindle forward run start (SRN: Y1898)

(6) Spindle reverse run start (SRI: Y1899)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	C AXIS SELECTION		R2568	R2768	R2968	R3168	R3368	R3568	R3768	R3968

[Function]

The "C axis selection" signal is used to issue the commands with the axis name command address to the axis selected from the Spindle/C-axis having the same axis name in the part system.

[Operation]

Using the axis number, set which spindle or C axis to output the commands to.

0: First C axis, 1: 1st axis, 2: 2nd axis, 3: 3rd axis, 4: 4th axis, ... 8: 8th axis

The setting is made with the axis number used in the part system.

(Note 1) This signal must always be input simultaneously with the "Recalculation request" signal (CRQ).

(Note 2) This signal is valid even when the multi-spindle function is invalid.

(Note 3) If an axis name (#1013 axname) is different from the initial C axis name, "M01 OPERATION ERROR 1031" will occur.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : AXIS SELECTION		R2580	R2780	R2980	R3180	R3380	R3580	R3780	R3980

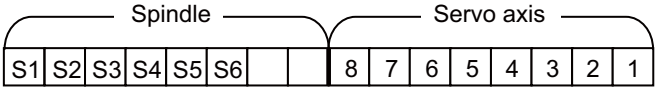
[Function]

The axis for load monitor I function is designated.

[Operation]

The axis for load monitor I function is designated with bit correspondence.

The load monitor I function will be carried out to all axes designated with this signal.



[Caution]

Specify the servo axes in the devices of each part system.

Specify the spindle in the device of the 1st part system.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)
(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)
(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC3 to YCC7)
(4) Load monitor I : Load change rate detection axis, Teaching data sub-No. (R2581,R2582)
(5) Load monitor I : Status output (1) to (10) (R596 to R605)
(6) Load monitor I : Cutting torque output value (R5492 to R5499)
(7) Load monitor I : Spindle cutting torque output value (R6528)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : LOAD CHANGE RATE DETECTION AXIS		R2581	R2781	R2981	R3181	R3381	R3581	R3781	R3981

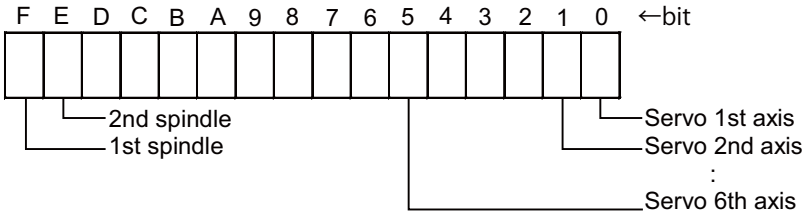
[Function]

The axis targeted for the change rate detection is designated.

[Operation]

With bit correspondence, designate the axis for detecting the change rate when judging the start of actual cutting during teaching and monitor operation.

If a change rate is detected for even one of the axes designated with this signal, it will be judged that actual cutting has started.



[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)
(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)
(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC3 to YCC7)
(4) Load monitor I : Axis selection/Teaching data sub-No. (R2580,R2582)
(5) Load monitor I : Status output (1) to (10) (R596 to R605)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : TEACHING DATA SUB-NO.		R2582	R2782	R2982	R3182	R3382	R3582	R3782	R3982

[Function]

The sub-No. for teaching and monitor operation is designated.

[Operation]

Designate the sub-No. of the data registered with teaching operation, and the sub-No. of data used for the monitor operation.

[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Teaching/Monitor mode in execution, Teaching mode valid, Monitor mode valid (XCA0 to XCA2)
(2) Load monitor I : Warning axis, Alarm axis, Data error information (R564 to R566)
(3) Load monitor I : Teaching/Monitor execution, Teaching mode, Monitor mode, Alarm reset, Warning reset (YCC3 to YCC7)
(4) Load monitor I : Axis selection/Load change rate detection axis (R2580,R2581)
(5) Load monitor I : Status output (1) to (10) (R596 to R605)

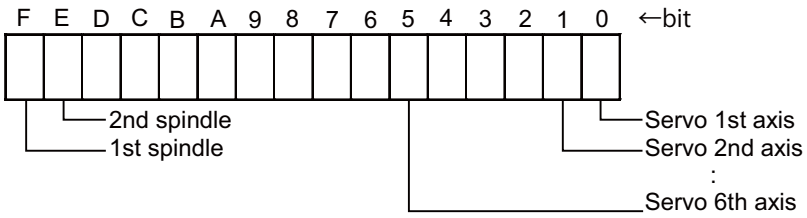
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : ADAPTIVE CONTROL BASIC AXIS SELECTION		R2583	R2783	R2983	R3183	R3383	R3583	R3783	R3983

[Function]

The basic axis for adaptive control is designated.

[Operation]

Designate which of the actual load's detection axes is targeted for adaptive control.
Only one of the monitor target axes is designated.



[Caution]

(1) This signal is prepared for a specific machine tool builder.

[Related signals]

(1) Load monitor I : Adaptive control in execution (XCA3)
(2) Load monitor I : Adaptive control execution (YCC9)
(3) Load monitor I : Adaptive control override (R571)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	EACH AXIS REFERENCE POSITION SELECTION		R2584	R2784	R2984	R3184	R3384	R3584	R3784	R3984

[Function]

Select the each axis reference position return position for manual reference position return.

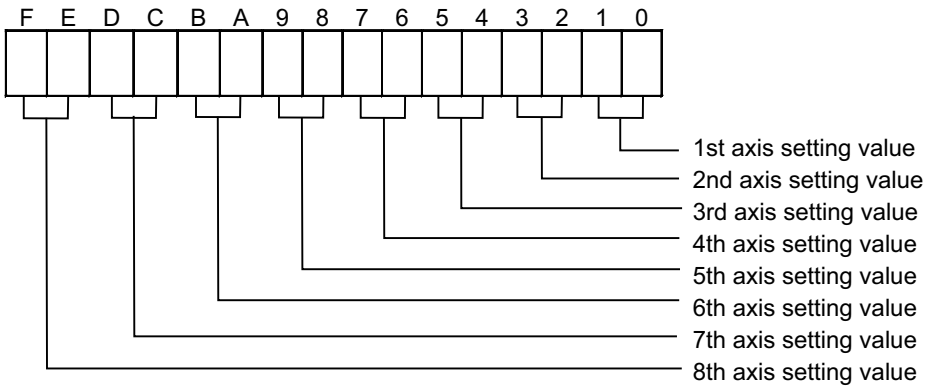
[Operation]

(1) This signal is valid when the reference position select method is ON.

(2) Two bits are used for each axis to select the reference position.

(a) R register and corresponding axis

Each axis reference position selection


F E D C B A 9 8 7 6 5 4 3 2 1 0
1st axis setting value
2nd axis setting value
3rd axis setting value
4th axis setting value
5th axis setting value
6th axis setting value
7th axis setting value
8th axis setting value

(b) Setting value and reference position No.

High-order bit	Low-order bit	Return position
0	0	1st reference position
0	1	2nd reference position
1	0	3rd reference position
1	1	4th reference position

[Related signals]

(1) Reference position selection method (M:YC97)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CHOPPING CONTROL DATA ADDRESS		R2587	R2787	R2987	R3187	R3387	R3587	R3787	R3987

[Function][Operation]

This signal designates the chopping control data head No. (R register No.) assigned to R register.

R register area that can be used for assigning the chopping control data is as shown below.

R8300 to R9768 (Backup area)

R9800 to R9886 (Non back up area)

[Caution]

(1) Setting error occurs if an odd number is set.

(2) When the backup area is used, set the area ahead of the compensation amount record area (#1324 chop_R).

(3) Error occurs if the chopping control data overlaps with the other part system or the compensation amount record area.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LIFE MANAGEMENT DATA SORT		R2588	R2788	R2988	R3188	R3388	R3588	R3788	R3988

[Function][Operation]

This signal is a flag for tool life data sort necessary/unnecessary.

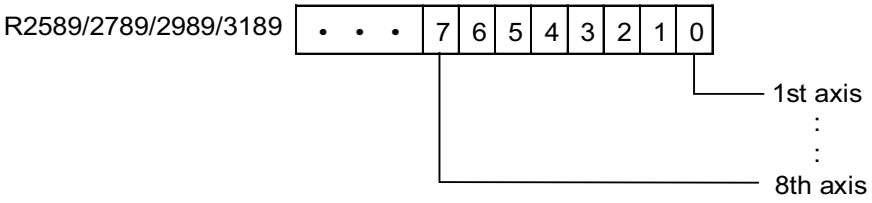
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SYNCHRONOUS CONTROL OPERATION METHOD		R2589	R2789	R2989	R3189	R3389	R3589	R3789	R3989

[Function][Operation]

(1) Synchronous control

Synchronous control for the 1st part system is designated with the R2589 register, and for the 2nd part system with the R2789 register.

Synchronous control can be turned ON and OFF by setting the bits corresponding to each axis in the R2589/2789/2989/3189 registers. The CNC changes the operation when all axes reach the in-position state.



(a) Designating the synchronous operation method

Turn ON both bits corresponding to the axis related to the reference axis and synchronized axis with the base specification parameter "#1068 slavno".

(Example) To operate the 2nd axis (reference axis) and 3rd axis (synchronized axis) in synchronization

	7	6	5	4	3	2	1	0	HEX
R2589	0	0	0	0	0	0	0	0	00
	0	0	0	0	0	1	1	0	06

(b) Designating the independent operation method

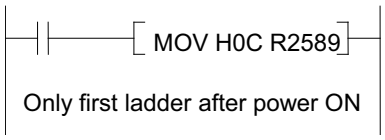
Turn ON only the bit corresponding to only one of the axes to be moved with the reference axis command.

(Example) To move only the 3rd axis (synchronized axis)

	7	6	5	4	3	2	1	0	HEX
R2589	0	0	0	0	0	0	0	0	00
	0	0	0	0	0	1	0	0	04

If, due to the machine structure, the synchronous state must always be entered immediately after the power is turned ON, set the R2589 register with the first ladder after the power is turned ON.

Example of ladder creation



(Note) The registers R2789 and later are used for the 2nd to 4th part system.

When changing the operation with the R2589/2789/2989/3189 register during automatic operation, calculate the coordinates again.

After synchronized axis independent operation is carried out, the end point coordinates of the synchronized axis are substituted in the program end point coordinates for the reference axis. Thus, if the coordinates are not recalculated, the reference axis' movement command will not be created properly.

Request recalculation immediately after the R2589/2789/2989/3189 register is changed.

<Example of ladder creation>

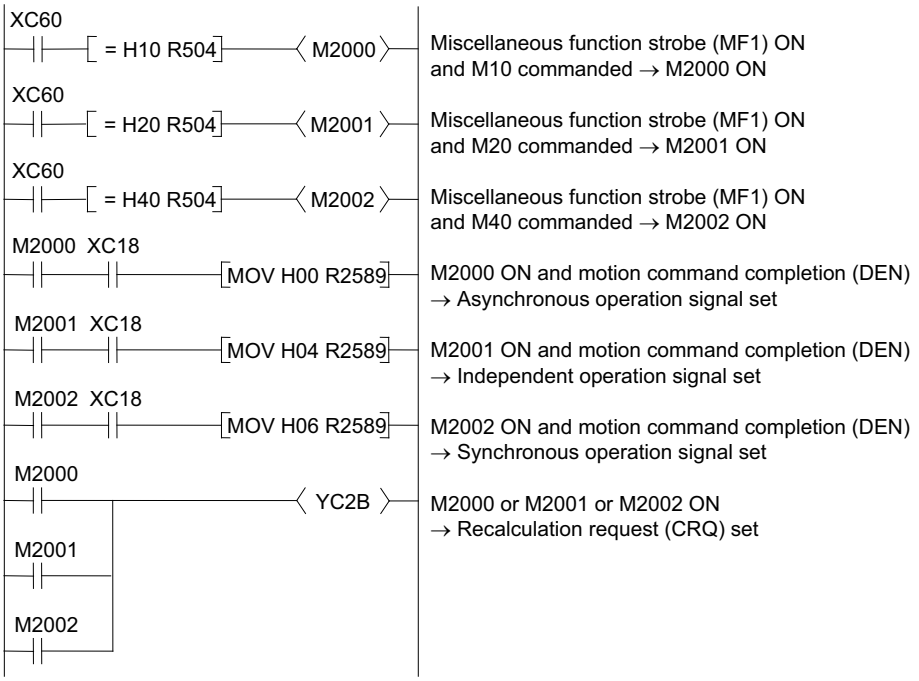
Reference axis: 2nd axis Synchronized axis: 3rd axis

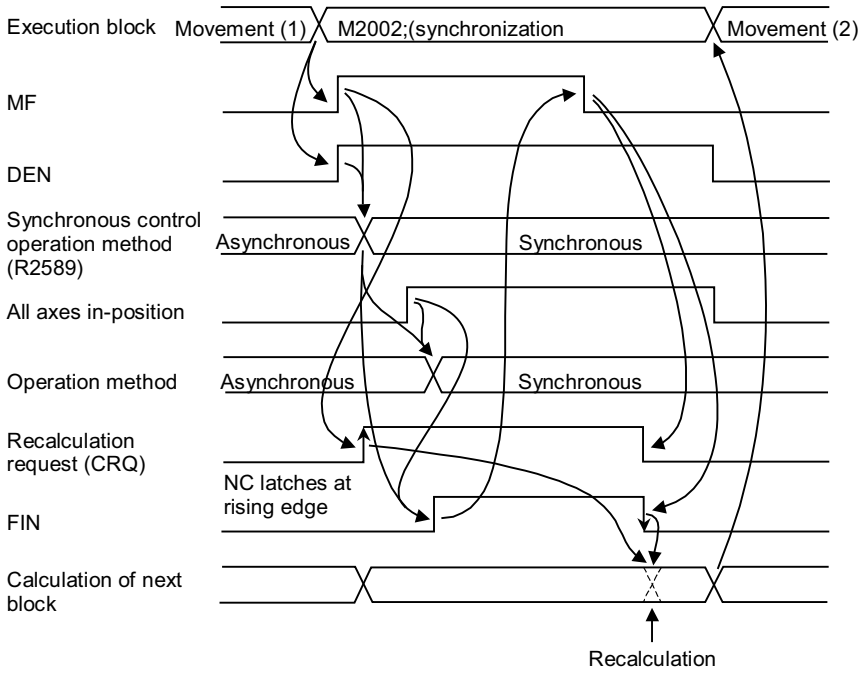
When M code is assigned to each:

M10: Asynchronous operation

M20: Independent operation

M40: Synchronous operation


XC60
= H10 R504
M2000
Miscellaneous function strobe (MF1) ON and M10 commanded → M2000 ON
XC60
= H20 R504
M2001
Miscellaneous function strobe (MF1) ON and M20 commanded → M2001 ON
XC60
= H40 R504
M2002
Miscellaneous function strobe (MF1) ON and M40 commanded → M2002 ON
M2000 XC18
MOV H00 R2589
M2000 ON and motion command completion (DEN) → Asynchronous operation signal set
M2001 XC18
MOV H04 R2589
M2001 ON and motion command completion (DEN) → Independent operation signal set
M2002 XC18
MOV H06 R2589
M2002 ON and motion command completion (DEN) → Synchronous operation signal set
M2000
YC2B
M2000 or M2001 or M2002 ON → Recalculation request (CRQ) set
M2001
M2002



[Caution]

(1) During synchronous operation or independent operation, the reference axis signals are valid for the "Interlock" and "Machine lock" signals, etc.

(2) The synchronized axis will return to the reference position in synchronization with the reference axis if G27, G28 or G30 is commanded during synchronous operation. If the synchronized axis is at the reference position when the reference axis completes reference position return, the reference position return will be completed. If the synchronized axis is not at the reference position when the reference axis completes reference position return, the "Reference position reached" signal for the reference axis will not be output.

(3) The position switches are processed independently for the reference axis and synchronized axis.

(4) Input the same OT signal for the reference axis and synchronized axis.
Set the same soft limit value for the reference axis and synchronized axis.
If the above settings cannot be made because of the machine specifications, observe the following points.
- If OT or soft limit occurs during the manual operation mode, an alarm will occur only for the synchronized axis, and the reference axis will not stop.Thus, make sure that the reference axis alarm turns ON before the synchronized axis.
- OT during the manual operation mode will cause the synchronized axis to stop when the OT signal for only the reference axis turns ON. The reference axis is stopped by the position controller, and the synchronized axis is stopped by the NC control unit.Thus, there may be a difference in the stop positions. If an excessive error alarm occurs because of OT, enter the correction mode, and cancel the alarm.

(5) The reference axis independent operation is handled as asynchronous, so the PLC input/output signal is not reflected on the synchronized axis.

(6) When the parameter "#1281 ext17/bit6" is ON, changing the "Synchronization control operation method" immediately changes the compensation amount of the synchronized axis in the external machine coordinate system compensation or the ball screw thermal expansion compensation:
- When the synchronous operation is changed to the independent operation; the reference axis compensation amount changes to the synchronized axis compensation amount.
- When the independent operation is changed to the synchronous operation; the synchronized axis compensation amount changes to the reference axis compensation amount.

(7) When the synchronous operation is set by the "Synchronization control operation method" while the parameter "#1281 ext17/bit6" is ON, the ball screw thermal expansion compensation is executed for the synchronized axis with the base axis compensation amount. R72 to R75, however, indicate each axis compensation amount.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL GROUP NO. DESIGNATION		R2590,1	R2790,1	R2990,1	R3190,1	R3390,1	R3590,1	R3790,1	R3990,1

[Function]

The group No. is designated when the unused tool of a group that has exceeded lifetime with the tool life management II or when forcibly changing tools currently in use.

[Operation]

The group designation range is as follows.

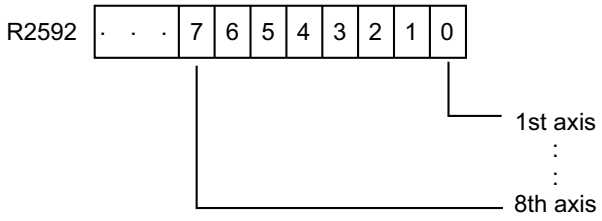
For group designation: 1 to 9999 of group No.

For all groups: 65535(all 1)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	REFERENCE POSITION ADJUSTMENT COMPLETION		R2592	R2792	R2992	R3192	R3392	R3592	R3792	R3992

[Function][Operation]

Upon the completion of the reference position adjustment to determine the reference position in the dog-type reference position return, input the bit, which corresponds to the master axis in the part system, from PLC.
Then, turn OFF this signal after the corresponding bit of "Reference position adjustment value parameter setting completed" signal is turned ON.
When the axis is outside the position switch range, execute an interlock on the axis and prohibit the movement of the axis targeted at by the position switch.



(Example)If the 2nd axis is the master axis, set the bits as follows after the completion of the reference position adjustment for the slave axis.

	7 6 5 4 3 2 1 0 HEX
R2592	o o o o o o o o 0 0 o o o o o o 1 o 0 2

[Caution]

A change of the reference position adjustment value requires another reference position return. If the automatic operation stars without the reference position return, an alarm occurs to inform the uncompleted return.

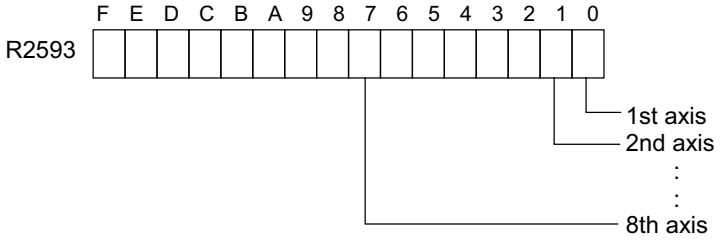
[Related signals]

(1) Reference position adjustment value parameter setting completed (R576)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CURRENT LIMIT CHANGEOVER		R2593	R2793	R2993	R3193	R3393	R3593	R3793	R3993

[Function][Operation]

Droop will be released when the corresponding bit for the droop release request signal is OFF.



[Related signals]

(1) In current limit n-th axis (ILI1 to 8: X900 to 7)
(2) Current limit reached n-th axis (ILA1 to 8: X920 to 7)
(3) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to 7)
(4) Droop release request n-th axis (DOR1 to 8: Y9C0 to 7)
(5) Current limit mode 1 and 2 (ILM1,2: YCC0,1)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	WEAR COMPENSATION NO. (Tool presetter)		R2594	R2794	R2994	R3194	R3394	R3594	R3794	R3994

[Function]

To clear the wear compensation amount after measuring the tool compensation amount with manual tool length measurement, set the wear compensation No. in a BCD code.

[Operation]

When the sensor is touched by the tool, wear data of the compensation No. automatically specified will be cleared to 0. If 0 or a non-existing compensation No. is set, the wear data will not be cleared.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	WORKPIECE COORDINATE OFFSET MEASUREMENT TOOL COMPENSATION NO./ SELECTED COMPENSATION TOOL NO.		R2600,1	R2800,1	R3000,1	R3200,1	R3400,1	R3600,1	R3800,1	R4000,1

[Function]

(1) External workpiece coordinate offset measurement function
Set the tool No. (R2602, 2603) and the tool compensation No. (R2600, 2601) used for workpiece coordinate offset measurement in a BCD code.

(2) Chuck barrier check
Set the tool No. (R2602, 2603) and the compensation No. (R2600, 2601) selected for the chuck barrier check.

[Operation]

(1) External workpiece coordinate offset measurement function
Set the tool No. and the tool compensation No. used for workpiece coordinate offset measurement in a BCD code. This is set with the user PLC.This tool No. (R2602, 2603) is interpreted as the tool offset No. by the CNC.

(2) Chuck barrier check
The file register used differs according to the parameter (#1097 Tlno.)

#1097 Tlno.	R2600,2601/R2800,2801	R2602,2603/R2802,2803
0	Tool length, tool nose wear offset No.	Tool No.
1	Tool nose wear offset No.	Tool No., tool length compensation No.

If the tool length compensation No. is not designated (if the contents are 0), the tool length and tool nose wear offset will both follow the T command modal.
The T command modal will also be followed if the designated offset No. is not within the specified range.
If the T command modal value is 0, the compensation amount will be interpreted as 0.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	WORKPIECE COORDINATE OFFSET MEASUREMENT TOOL NO. / SELECTED TOOL NO. (Main)		R2602,3	R2802,3	R3002,3	R3202,3	R3402,3	R3602,3	R3802,3	R4002,3

[Function][Operation]

Refer to the explanation for R2600 and R2601 for details.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SELECTION TOOL COMPENSATION NO. (Sub)		R2604,5	R2804,5	R3004,5	R3204,5	R3404,5	R3604,5	R3804,5	R4004,5

[Function]

(1) Workpiece coordinate offset measurement function
Set the tool compensation No. used in the sub spindle side for external workpiece coordinate offset measurement in a BCD code.

(2) Chuck barrier check
Designate the tool No. and compensation No. selected on the sub-spindle side for chuck barrier check.

[Operation]

(1) Workpiece coordinate offset measurement function
Set the tool compensation No. used in the sub spindle side for external workpiece coordinate offset measurement in a BCD code.

(2) Chuck barrier check
The file register used differs according to the parameter (#1097 Tlno.)

#1097 Tlno.	R2604,2605/R2804,2805	R2606,2607/R2806,2807
0	Tool length, tool nose wear offset No.	Tool No.
1	Tool nose wear offset No.	Tool No., tool length compensation No.

If the tool length compensation No. is not designated (if the contents are 0), both the tool length and tool nose wear offset follow the details designated for the main spindle. The details for the main spindle will also be set if the designated offset No. is not within the specified range.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SELECTION TOOL WEAR NO. (Sub)		R2606,7	R2806,7	R3006,7	R3206,7	R3406,7	R3606,7	R3806,7	R4006,7

[Function][Operation]

Refer to the section for the "Selection tool compensation No. (sub) (R2604, 5)".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL MOUNTING INFORMATION m		R2608,9	R2808,9	R3008,9	R3208,9	R3408,9	R3608,9	R3808,9	R4008,9

[Function]

Designate the presence of a tool mounted on the tool post (tool compensation amount validity).

[Operation]

When the tool designated for tool mounting is selected, the tool compensation amount will be added to the chuck barrier check.

<Bit allocation>

Tool mounting information (high order)	bitF	bitE	bitD	bitC	bitB	bitA	bit9	bit8
	Tool 32	Tool 31	Tool 30	Tool 29	Tool 28	Tool 27	Tool 26	Tool 25
R2609/	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
R2809	Tool 24	Tool 23	Tool 22	Tool 21	Tool 20	Tool 19	Tool 18	Tool 17

Tool mounting information (low order)	bitF	bitE	bitD	bitC	bitB	bitA	bit9	bit8
	Tool 16	Tool 15	Tool 14	Tool 13	Tool 12	Tool 11	Tool 10	Tool 9
R2608/	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
R2808	Tool 8	Tool 7	Tool 6	Tool 5	Tool 4	Tool 3	Tool 2	Tool 1

Bit OFF: Tool not mounted (tool compensation amount not added)

Bit ON: Tool mounted (tool compensation amount added)

In a machine that uses tools 1 to 12 on the main spindle's tool post and tools 17 to 28 on the sub-spindle's tool post, if the tools are mounted in either tool post, H0FFF is set for both R2608 and R2609.

When tool 28 is detached from the sub-spindle side next, R2609 will be set to H07FF.

[Remark]

This signal is initialized to HFFFF when the power is turned ON.

Thus, if this signal is not used, the tool compensation amount will always be added to the chuck barrier check.

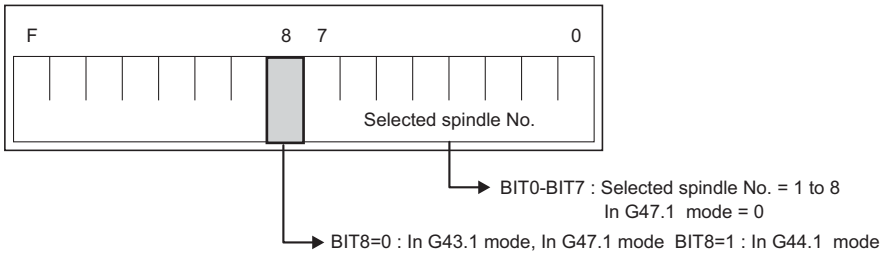
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MULTIPLE-SPINDLE CONTROL I: SE-LECTED SPINDLE NO.	SLSPNO	R2614	R2814	R3014	R3214	R3414	R3614	R3814	R4014

[Function]

This signal gives information on the selected spindle (G43.1/G44.1 mode, spindle number) of each part system.

(Note 1) The given information is the spindle number, not spindle name.

(Note 2) BIT8 and BIT0-BIT7 become "0" when G47.1 (all spindle selection) mode is entered.


F
8
7
0
Selected spindle No.
BIT0-BIT7 : Selected spindle No. = 1 to 8
In G47.1 mode = 0
BIT8=0 : In G43.1 mode, In G47.1 mode BIT8=1 : In G44.1 mode

[Operation]

The information on selected spindle is output at the following timing.

(1) At power ON /NC reset

The information on the currently selected spindle is output based on the parameter settings.

(Example)

$1: Initial G43.1 mode (#1199 Sselect = 0, #12090 SnG43.1 = 1, #1534 SnG44.1 = 2)

R register for part systems ($1)		
R2614	BIT8 = 0	1

$2: Initial G44.1 mode (#1199 Sselect = 1, #12090 SnG43.1 = 1, #1534 SnG44.1 = 2)

R register for part systems ($2)		
R2814	BIT8 = 1	2

$3: Initial G47.1 mode (#1199 Sselect = 2)

R register for part systems ($3)		
R3014	BIT8 = 0	0

(2) When G43.1/G44.1/G47.1 is commanded

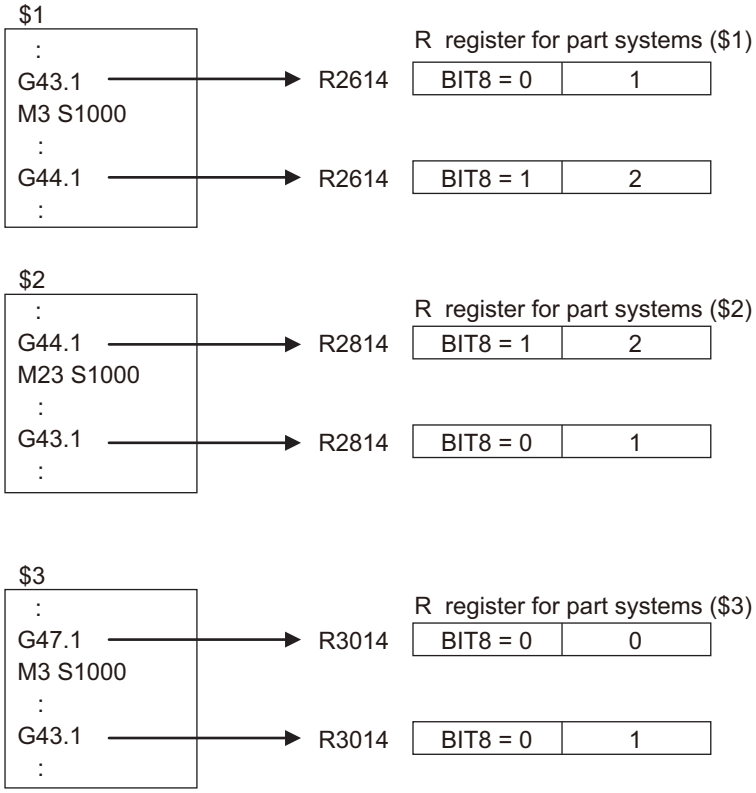
When G43.1/G44.1/G47.1 command is executed, the information on selected spindle after command execution is output.

(Example) 1st spindle Spindle name: 1 (#3077 Sname = 1)

#12090 SnG43.1 = 1

2nd spindle Spindle name: 2 (#3077 Sname = 2)

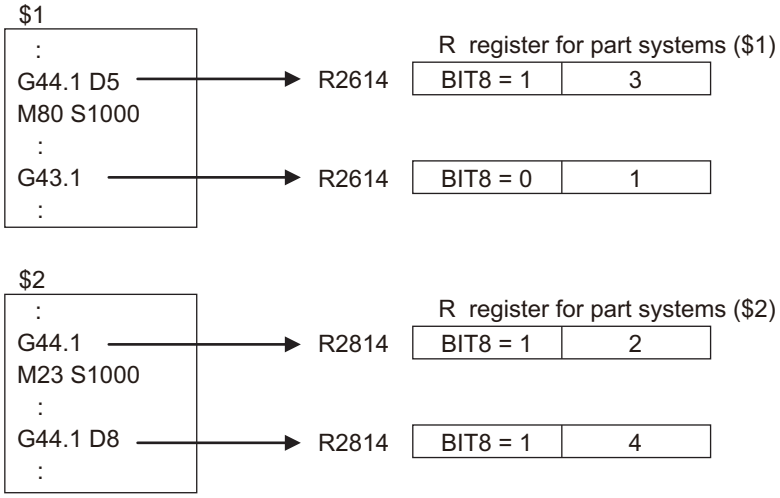
#1534 SnG44.1 = 2



(3) When G44.1D is commanded

When G44.1D command is executed, the information on selected spindle after command execution is output.

(Example) 1st spindle Spindle name: 1 (#3077 Sname = 1)
2nd spindle Spindle name: 2 (#3077 Sname = 2)
3rd spindle Spindle name: 5 (#3077 Sname = 5)
4th spindle Spindle name: 8 (#3077 Sname = 8)
#1534 SnG44.1 = 2



Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	TOOL LENGTH MEASUREMENT 2 TOOL NO.		R2618	R2818	R3018	R3218	R3418	R3618	R3818	R4018

[Function]

Set the compensation No. of the tool data for setting the measurement result during manual tool length measurement II. This is set in BCD code.

[Operation]

When the sensor is touched by the tool, compensation amount will be written into the tool data of the compensation No. automatically specified.

This tool No. is interpreted as the tool compensation No. by the CNC.

[Related signals]

(1) Wear compensation No. (R2594)
(2) Tool length measurement 2 (TLMS: YC21)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CONSTANT TORQUE CONTROL: CONSTANT TORQUE/ PROPORTIONAL TORQUE STOPPER CONTROL REQUEST AXIS		R2620	R2820	R3020	R3220	R3420	R3620	R3820	R4020

[Function]

This signal commands constant torque control or proportional torque stopper control. By turning the axis bit of a part system ON, constant torque control or proportional torque stopper control is performed for the corresponding axis.

BIT	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Axis	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
	Proportional torque stopper control request axis								Constant torque control request axis							

(Note 1) The axis bit configuration for part systems are the same as the basic axis configuration.

[Operation]

(1) High-order 8 bits: The Proportional torque stopper control request axis bit

When the bit of the specified axis turns ON, the servomotor for the axis generates a constant torque in the stopper direction according to the value that is set in "#2296 SV096 TQC" (Stopper torque for constant torque control). When a position droop occurs, the stopper position is maintained with a torque generated in proportion of the position droop.

(2) Low-order 8 bits: The Constant torque control request axis bit

When the bit of the specified axis turns ON, the servomotor for the axis outputs a constant torque in a constant direction according to the value that is set in "#2296 SV096 TQC" (Stopper torque for constant torque control).

[Related signals]

(1) Constant torque control: Axis under constant torque/proportional torque stopper control (R624)

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CONSTANT TORQUE CONTROL: CONSTANT TORQUE DROOP CANCEL REQUEST AXIS		R2621	R2821	R3021	R3221	R3421	R3621	R3821	R4021

[Function]

This signal commands constant torque droop cancellation. By turning the axis bit of a part system ON, constant torque droop cancellation is performed for the corresponding axis.

BIT	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Axis	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
	Not used								Constant torque droop cancellation request axis							

(Note 1) The axis bit configuration for part systems are the same as the basic axis configuration.

[Operation]

Position droop cancellation and command position update are performed when the axis bit is turned ON for an axis for which you want to clear the position droop generated during constant torque control.

[Related signals]

(1) Constant torque control: Constant torque droop cancel axis status (R625)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SERVO READY COMPLETION OUTPUT DESIGNATION		R2625	R2825	R3025	R3225	R3425	R3625	R3825	R4025

[Function]

"Servo ready completion" (SA) signal indicates that the servo system is ready for normal operation. The signal can be output to a Y device of remote I/O, which is designated by this register.

The direct transfer of the signal from CNC to remote I/O allows the output of the signal during PLC is stopped.

[Operation]

The first setting data since the power ON is valid.Only the first setting is valid. The value changed later is invalid.

The setting range is 1 to 5FF (HEX), except for 2C0 to 2FF.

If the first setting of Y device No. is out of range, the signal is not output to the Y device. To output the signal, turn the power ON again and then set the Y device No. again within the range.

[Caution]

(1) Setting "0" does not mean the output to Y0. This setting is invalid.

(2) If the "Servo ready completion" signal is OFF on either of the R registers (among R2625/R2825/R3025/R3225) with the overlapped setting value, the signals to be output to Y device turn OFF.

(3) Y2C0 to 2FF, which are used by the system, cannot be set as servo ready completion output designation.

(4) This register, if designated after the "Servo ready completion" signal is ON without initial ladders, turns valid from the time of the setting and the signal is output to Y device.

(5) The devices Y300 to Y5FF are available when the external PLC link such as PROFIBUS-DP and CC-Link is connected.

(6) Do not control the designated Y devices with user PLC. When the device is controlled with user PLC, the "Servo ready completion" signal is overwritten and turns invalid.

(7) If the servo ready completion output designation, which has not been set with this register, is written twice in 1 scan of user PLC, the latter setting is valid.

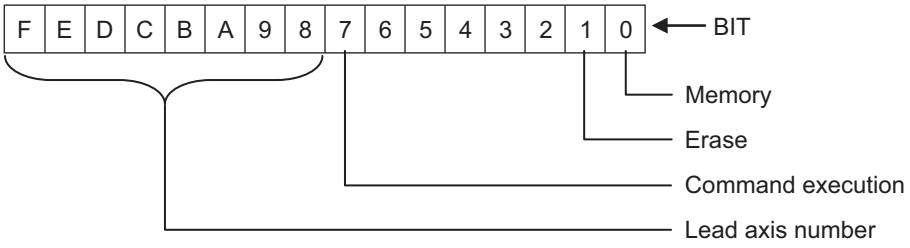
[Related signals]

(1) Servo ready completion (SA: XC11)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	THREAD RECUTTING COMMAND		R2626	R2826	R3026	R3226	R3426	R3626	R3826	R4026

[Function]

This signal commands memorization or deletion of the position data that is used by the thread recutting function.
This signal needs to be set from the ladder when the thread recutting operation from the ladder ("#1258 set30" /bit4 = "1") is selected.
When the thread recutting operation from Mitsubishi HMI ("#1258 set30" /bit4 = "0") is selected, thread recutting operation is disabled even if this signal is set.



[Operation]

BIT0 [Memory]:	If this bit is ON when the command is executed, the NC stores "spindle number", "spindle position", "lead axis number" and "lead axis machine coordinate" in the NC memory.
BIT1 [Erase]:	If this bit is ON when the command is executed, the NC erases "spindle number", "spindle angle", "lead axis number" and "lead axis machine coordinate" from the NC memory.
BIT7 [Command execution]:	The NC performs "memory" (BIT0) or "erase" (BIT1) operation at the rising edge of this bit. An error occurs if both "memory" and "erase" bits are ON or OFF.
BIT8 to F [Lead axis number]:	The lead axis number of the axis that performs thread recutting is set in binary using these bits. The range of numbers that can be set is 0x00 to 0xFF. Set the 1st axis to "1" in the command. The number in the command is memorized as the lead axis number.

[Related signals]

(1) Thread recutting status (R648)
(2) Thread recutting lead axis No. (R651)

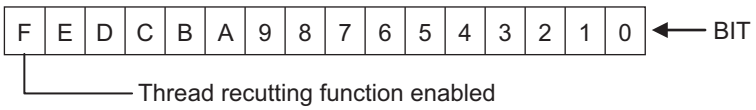
Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	THREAD RECUTTING EXECUTION OPERATION		R2627	R2827	R3027	R3227	R3427	R3627	R3827	R4027

[Function]

This signal commands various operations related to thread recutting.

This signal needs to be set from the ladder when the thread recutting operation from the ladder ("#1258 set30" /bit4 = "1") is selected.

When the thread recutting operation from Mitsubishi HMI ("#1258 set30" /bit4 = "0") is selected, Thread recutting operation is disabled even if this signal is set.



[Operation]

BITF [Thread recutting function enabled]:

Turn this bit ON to perform thread recutting.

When thread recutting can be performed, BIT F of the "Thread recutting execution status" (R649) signal turns ON.
To perform normal thread cutting, turn this bit OFF.

[Related signals]

(1) Thread recutting execution status (R649)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MECHANICAL AXIS SPECIFICATIONS 1ST ROTARY AXIS ANGLE		R2628,9	R2828,9	R3028,9	R3228,9	R3428,9	R3628,9	R3828,9	R4028,9
A	MECHANICAL AXIS SPECIFICATIONS 2ND ROTARY AXIS ANGLE		R2630,1	R2830,1	R3030,1	R3230,1	R3430,1	R3630,1	R3830,1	R4030,1

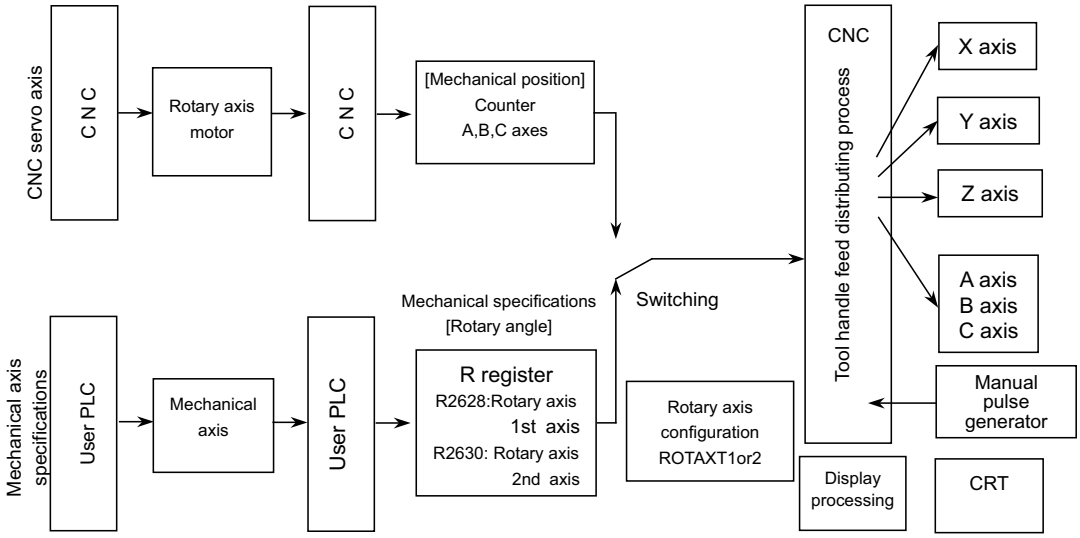
[Function]

This signal sets rotary axis angle of the mechanical axis specifications.

The setting range is 0 to ±720000(1degree/1000).

[Operation]

When handle-feeding to tool axis direction/tool radius direction in the mechanical axis specifications, the rotary axis angle can be input by writing the angle in R register with the user PLC.



R register	Details	Input range
R2628 R2629	Mechanical specifications rotary axis 1st angle R2628(low order)/R2629(high order)	0 to ± 720000 (1degree/1000)
R2630 R2631	Mechanical specifications rotary axis 2nd angle R2630(low order)/R2631(high order)	0 to ± 720000 (1degree/1000)

(Example) Writing 90 degree on A axis and 180 degree on C axis with A-C axes configuration is shown as below.

A axis: 90 angle × 1000 1/1000degree = 90000 System unit

```
 ┤ ├─[ DMOV   K90000   R2628]─
```

C axis: 180 angle × 1000 1/1000degree = 180000 System unit

```
 ┤ ├─[ DMOV   K180000   R2630]─
```

[Caution]

(1) Tool center point rotary mode cannot be used during the mechanical axis in use.

(2) Do not change the rotary axis angle of the mechanical axis during tool handle feed & interruption.

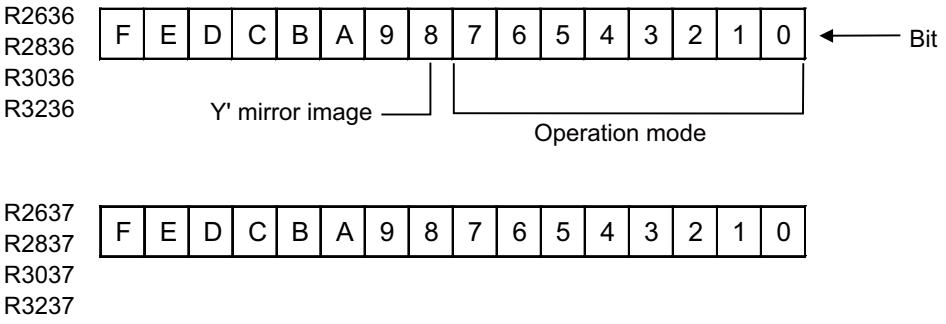
(3) When angle of the mechanical axis is written in R register, only for the tool center point value counter on the position display screen will be updated. Other counters will not be updated.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CIRCULAR FEED IN MANUAL MODE OPERATION MODE DATA		R2636,7	R2836,7	R3036,7	R3236,7	R3436,7	R3636,7	R3836,7	R4036,7

[Function]

The operation mode for the circular feed in manual mode is designated.

[Operation]



- Operation mode: Designate the coordinate setting.

Setting value	Description
1	Linear-linear coordinate is selected.
2	Circular-linear coordinate is selected. ("+" indicates the CW direction of X'.)
3	Circular-linear coordinate is selected. ("+" indicates the CCW direction of X'.)

The setting value other than above is invalid.

- Y' mirror image: Reverse the "+" direction of Y'.

Setting value	Description
0	Y' mirror image is not valid
1	Y' mirror image is valid

[Caution]

(1) This data is valid when the "Circular feed in manual mode valid" signal is ON.

(2) The data, when changed while the "Circular feed in manual mode valid" signal is ON, is not valid.

[Related signals]

(1) Circular feed in manual mode valid (YC7E)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CIRCULAR FEED IN MANUAL MODE BASIC POINT X DATA		R2644,5	R2844,5	R3044,5	R3244,5	R3444,5	R3644,5	R3844,5	R4044,5
A	CIRCULAR FEED IN MANUAL MODE BASIC POINT Y DATA		R2648,9	R2848,9	R3048,9	R3248,9	R3448,9	R3648,9	R3848,9	R4048,9

[Function]

Designate a basic point on the hypothetical coordinate.

[Operation]

Designate a basic point on the hypothetical coordinate using the machine coordinate system.

The setting range differs in each PLC setting unit.

	PLC setting unit	
	mm	inch
(B)	± 99999.999mm	± 3937.0078inch
(C)	± 9999.9999mm	± 393.70078inch

[Caution]

(1) This data is valid when the "Circular feed in manual mode valid" signal is ON.

(2) The data, when changed while the "Circular feed in manual mode valid" signal is ON, is not valid.

(3) The basic point coordinate is designated with "0.5*PLC setting unit"

(4) When "1" is set to the parameter "#1040 M_inch", set the data by inch.

[Related signals]

(1) Circular feed in manual mode valid (YC7E)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CIRCULAR FEED IN MANUAL MODE TRAVEL RANGE X+ DATA		R2652,3	R2852,3	R3052,3	R3252,3	R3452,3	R3652,3	R3852,3	R4052,3
A	CIRCULAR FEED IN MANUAL MODE TRAVEL RANGE X- DATA		R2656,7	R2856,7	R3056,7	R3256,7	R3456,7	R3656,7	R3856,7	R4056,7
A	CIRCULAR FEED IN MANUAL MODE TRAVEL RANGE Y+ DATA		R2660,1	R2860,1	R3060,1	R3260,1	R3460,1	R3660,1	R3860,1	R4060,1
A	CIRCULAR FEED IN MANUAL MODE TRAVEL RANGE Y- DATA		R2664,5	R2864,5	R3064,5	R3264,5	R3464,5	R3664,5	R3864,5	R4064,5

[Function]

Designate the travel range on the hypothetical coordinate.

[Operation]

Designate the travel ranges with the value in the "+" or "-" direction on the hypothetical coordinate. Set the hypothetical coordinate value in the following state.

"Linear-linear" hypothetical coordinate	Y' axis: mirror image is not valid
"Circular-linear" hypothetical coordinate	X' axis: "+" indicates the inverse (CW) direction Y' axis: mirror image is not valid

In the "circular-linear" mode, set the travel range of X' by the angle from the basic point on the hypothetical coordinate.

The setting range differs in each PLC setting unit.

	PLC setting unit		
	mm	inch	angle
(B)	± 99999.999mm	± 3937.0078inch	± 360.000°
(C)	± 9999.9999mm	± 393.70078inch	± 360.0000°

[Caution]

(1) The data, when changed while the "Circular feed in manual mode valid" signal is ON, is not valid.

(2) The basic point is treated as zero point on the hypothetical coordinate.

(3) The basic point coordinate is designated with "0.5*PLC setting unit"

(4) When "1" is set to the parameter "#1040 M_inch", set the data by inch.

[Related signals]

(1) Circular feed in manual mode valid (YC7E)

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	CIRCULAR FEED IN MANUAL MODE GRADIENT/ARC CENTER X DATA		R2668,9	R2868,9	R3068,9	R3268,9	R3468,9	R3668,9	R3868,9	R4068,9
A	CIRCULAR FEED IN MANUAL MODE GRADIENT/ARC CENTER Y DATA		R2672,3	R2872,3	R3072,3	R3272,3	R3472,3	R3672,3	R3872,3	R4072,3

[Function]

Designate the gradient on the "linear-linear" hypothetical coordinate, or the arc center on the "circular-linear" hypothetical coordinate.

[Operation]

How to designate differs in each operation mode.

Operation mode is "Linear-linear" (1)	Use the X-Y ratio to designate the gradients of X axis on the machine coordinate and X' axis on the hypothetical coordinate. Signs are available. "+" indicates the CCW direction from the X axis. If the gradient is 45°, X and Y should have the same value. The designation unit follows the PLC setting unit. PLC setting unit(B) : ± 99999.999 PLC setting unit(C) : ± 9999.9999
Operation mode is "Arc-linear" (2 or 3)	Designate an arc center on the hypothetical coordinate using the machine coordinate system. The designation unit follows the PLC setting unit. [Millimeter] PLC setting unit(B) : ± 99999.999 [mm] PLC setting unit(C) : ± 9999.9999 [mm] [Inch] PLC setting unit(B) : ± 3937.0078 [inch] PLC setting unit(C) : ± 393.70078 [inch]

[Caution]

(1) This data is valid when the "Circular feed in manual mode valid" signal is ON.
(2) The data, when changed while the "Circular feed in manual mode valid" signal is ON, is not valid.
(3) The arc center coordinate and gradient are designated with "0.5*PLC setting unit"
(4) When "1" is set to the parameter "#1040 M_inch", set the data by inch.

[Related signals]

(1) Circular feed in manual mode valid (YC7E)

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	3D MACHINE INTERFERENCE CHECK : ENABLED SHAPE GROUP NO. 1 to 4		R4400 to 3

[Function]

This signal is used to update the shape group of the 3D machine interference check. Set the No. of shape group which is currently specified as the interference check target. This signal is enabled while the 3D machine interference check is ON.

If you select a shape group through the [3D Monitor] screen, the group No. is set in the 3D Machine Interference Check : Requested shape group No.. Then set this value in the Enabled shape group No. signal.

[Operation]

When the Enabled shape group No. changes, the jig or workpiece model is updated. The 3D machine interference check is implemented using the updated model.

If the setting is changed during axis movement, the axis will decelerate to a stop while the model is being updated.

(Note 1) This signal is inoperative during automatic operation.
(Note 2) Shapes defined in Group 1 are within the scope of the interference check, but those of Groups 2 to 4 are outside that scope.

[Related signals]

(1) 3D Machine Interference Check : Requested shape group No. (R2400)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	EXT. MACHINE COORDINATE SYSTEM OFFSET DATA n-TH AXIS		R5700 to 15	R5716 to 31	R5732 to 47	R5748 to 63

[Function]

This data compensates the basic machine coordinate system. The axis moves the amount equivalent to the set data (machine error compensation unit). The entire coordinate system value, including the basic machine coordinate system, will not change.

[Operation]

When the "Ext. machine coordinate system offset data" (R5700 to 15) is set, the axis will move the amount equivalent to that set value.

The entire coordinate system value, including the basic machine coordinate system, will not change.

If the changed amount of the set value exceeds the rapid traverse feedrate, the set value turns invalid: the compensation is executed with the set value unchanged.

<Data range>

80000000 (HEX) to 7FFFFFFF (HEX) (Absolute compensation amount -2147483648 to 2147483647)

Unit: Machine error compensation unit

[Related signals]

(1) Ext. machine coordinate system offset data illegal n-th axis (XA40 to XA47)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	EACH AXIS MANUAL FEEDRATE B n-TH AXIS		R5764 to R5779	R5780 to R5795	R5796 to R5811	R5812 to R5827

[Function]

When the each axis manual feedrate B valid signal is valid, designate the manual feedrate for the axis selected with the manual feedrate B valid signal.

[Operation]

(1) When the each axis manual feedrate B valid signal is valid, the each axis speed designated with this register is valid for the manual feedrate of an axis for which the manual feedrate B valid signal is valid.
(2) Cutting override and manual override are invalid for this register's speed.
(3) This register is not related to the dry run speed.
(4) A binary value is directly set for this register. The setting unit is 0.01mm/min (°/min).
(5) This signal is a register independent for each axis.

[Related signals]

(1) Manual feedrate B valid (FBEn:Y940 to Y947)
(2) Each axis manual feedrate B valid (YC7C)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	USER MACRO INPUT #1032 (PLC -> NC)		R6436,7	R6444,5	R6452,3	R6460,1

[Function]

This is interface function used to coordinate user PLC to user macro.

(Note) The other signals from R0 to R99 are PLC inputs, but this signal is output to the NC from PLC.

[Operation]

The data set in file registers Rn and Rn+1 with the user PLCs, can be referred to on the user macro side with the user macro system variables #1000 to #1031 or #1032.

The relationship between system variable and file register is as follows:

System variable	Points	Interface input signal	System variable	Points	Interface input signal
#1000	1	Register R6436 bit 0	#1016	1	Register R6437 bit 0
#1001	1	Register R6436 bit 1	#1017	1	Register R6437 bit 1
#1002	1	Register R6436 bit 2	#1018	1	Register R6437 bit 2
#1003	1	Register R6436 bit 3	#1019	1	Register R6437 bit 3
#1004	1	Register R6436 bit 4	#1020	1	Register R6437 bit 4
#1005	1	Register R6436 bit 5	#1021	1	Register R6437 bit 5
#1006	1	Register R6436 bit 6	#1022	1	Register R6437 bit 6
#1007	1	Register R6436 bit 7	#1023	1	Register R6437 bit 7
#1008	1	Register R6436 bit 8	#1024	1	Register R6437 bit 8
#1009	1	Register R6436 bit 9	#1025	1	Register R6437 bit 9
#1010	1	Register R6436 bit 10	#1026	1	Register R6437 bit 10
#1011	1	Register R6436 bit 11	#1027	1	Register R6437 bit 11
#1012	1	Register R6436 bit 12	#1028	1	Register R6437 bit 12
#1013	1	Register R6436 bit 13	#1029	1	Register R6437 bit 13
#1014	1	Register R6436 bit 14	#1030	1	Register R6437 bit 14
#1015	1	Register R6436 bit 15	#1031	1	Register R6437 bit 15

System variable	Points	Interface input signal
#1032	32	Register R6436, R6437
#1033	32	Register R6438, R6439
#1034	32	Register R6440, R6441
#1035	32	Register R6442, R6443

This correspondence table shows the example for file registers R6436 and R6437.

File registers R6436 and R6437 correspond to system variables #1000 to #1031, and #1032 (32-bit data).

To use the R register of the 2nd and subsequent part system, set "1" to "#1230 set02/bit7".

[Related signals]

(1) User macro input #1033, #1034, #1035 (R6436/6437,R6438/6439,R6440/6441,R6442/6443)

(2) User macro output #1132, #1133, #1134, #1135 (R6372/6373,R6374/6375,R6376/6377,R6378/6379)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	USER MACRO INPUT #1033 (PLC -> NC)		R6438,9	R6446,7	R6454,5	R6462,3

[Function]

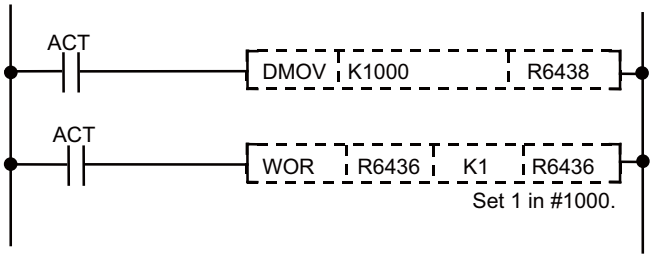
This provides interface function used to coordinate user PLC to user macro.

[Operation]

The data set in file registers Rn and Rn+1 with the user PLCs, can be referred to on the user macro side with the user macro system variables #1033.

(Example)

Sequence program



User macro program

```
IF [#1000  EQ  0]  GOTO  100
#100 = #1033
N100
```

The #1033(R6438, R6439) data is read into #100
Other than when #1000 is set to 0.

[Related signals]

(1) User macro input #1032, #1034, #1035 (R6436/6437,R6440/6441,R6442/6443)

(2) User macro output #1132, #1133, #1134, #1135 (R6372/6373,R6374/6375,R6376/6377,R6378/6379)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	USER MACRO INPUT #1034 (PLC -> NC)		R6440,1	R6448,9	R6456,7	R6464,5

[Function][Operation]

The function, operation, etc. are the same as those of "USER MACRO INPUT #1033".

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4
A	USER MACRO INPUT #1035 (PLC -> NC)		R6442,3	R6450,1	R6458,9	R6466,7

[Function][Operation]

The function, operation, etc. are the same as those of "USER MACRO INPUT #1033".

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE COMMAND ROTATION SPEED OUTPUT		R7000,1	R7050,1	R7100,1	R7150,1	R7200,1	R7250,1	R7300,1	R7350,1

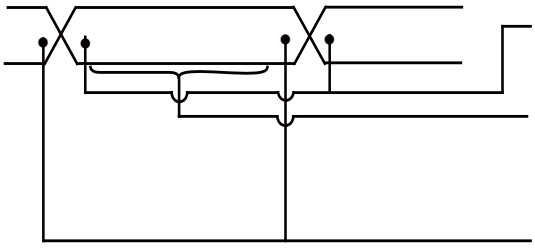
[Function]

By setting data of desired spindle speed to this signal, the spindle can be run at that speed.

[Operation]

When this signal is used, operation is same as the case where usual spindle command rotation speed input signal (R6500, 1) is given. Difference is that when data is set by user PLC, priority is given to that data over spindle (S) command data specified in automatic operation, or by manual command setting.

User PLC main (medium-speed) operation pattern



(1) "Spindle command rotation speed input data" is set to the "output data" at the head of user PLC main program (controller process).

(2) "Spindle command rotation speed output data" can be rewritten by user PLC within this interval if necessary (PLC process).

(3) "Spindle command rotation speed output data" is processed at the end of user PLC and signal is given to spindle controller (controller process).

(Note 1) "Spindle command rotation speed output data" is rewritten by user PLC for each scan (constant).

(Note 2) "Spindle speed override", "Spindle gear selection code 1,2 (GI1, GI2)", "Spindle stop (SSTP)", "Spindle gear shift (SSFT)" and "Spindle orientation (SORC)" conditions are added to "Spindle command rotation speed output data" and sent to the spindle controller.

(Note 3) For flow of spindle (S) function command data, data update timing, etc., refer to the section for normal "Spindle command rotation speed input" signal (R6500, 1).

[Related signals]

(1) Spindle command rotation speed input (R6500, R6501)

(2) Spindle command final data (R6502, R6503)

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE COMMAND SELECTION	SLSP	R7002	R7052	R7102	R7152	R7202	R7252	R7302	R7352

[Function]

Set which the part system the S command is output from when the multiple-spindle control II is valid.

0: 1st part system
1: 2nd part system
2: 3rd part system
3: 4th part system

(Note) If a setting value exceeds the maximum number of part systems determined by specifications, it will be interpreted that a selection has not been made.

[Operation]

If an S command is given while the spindle selection (SWS) and spindle command selection (SLSP) have already been input through different blocks, this S command is handled as a rotation speed command of the selected spindle. The selected spindle rotates at the rotation speed which was output. The spindles which were de-selected by the "Spindle selection" signal (SWS) OFF continue to rotate at the same rotation speed as the speed immediately before their de-selection. This allows each spindle to be rotated simultaneously at a different rotation speed. The "Spindle command selection" signal is used to select which of the spindles is to receive the S command from which part system.

[Caution]

If the spindle selection (SWS) or spindle command selection (SLSP) is executed through an M code given in the same block as an S code, the spindle selection (spindle rotation speed) will not be updated.

[Related signals]

(1) Spindle selection (SWS: Y18A8)
(2) Spindle stop (SSTP: Y1894)
(3) Spindle enable (ENB: X18A0)
(4) Encoder selection (R2567)
(5) Spindle forward run start (SRN: Y1898)
(6) Spindle reverse run start (SRI: Y1899)

Contact	Signal name	Signal abbreviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	OPTIMUM ACCELERATION/ DECELERATION PARAMETER GROUP SELECTION [SPINDLE] N-TH AXIS	SPESL1 to 8	R7003	R7053	R7103	R7153	R7203	R7253	R7303	R7353

[Function]

This signal selects the operation parameter group.

[Operation]

- Enter the operation parameter group from 0 to 3.
  0: Standard (standard inertial mass)
  1: Level 1 (medium inertial mass)
  2: Level 2 (big inertial mass)
  3: Level 3 (huge inertial mass)
- Select the parameter group with this register and specify the switching axis to "Optimum acceleration/deceleration parameter switching axis (axis and bit selection)" (R2617) or "Optimum acceleration/deceleration parameter switching axis (spindle and bit selection)" (R391). Then, turn "Optimum acceleration/deceleration parameter switching request [axis]" signal (YCD5) or "Optimum acceleration/deceleration parameter switch request [spindle]" signal (Y711) ON.
- If the value other than 0 to 3 is set, it will be handled as "0: Standard".

[Caution]

(1) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	S COMMAND OVERRIDE		R7008	R7058	R7108	R7158	R7208	R7258	R7308	R7358

[Function]

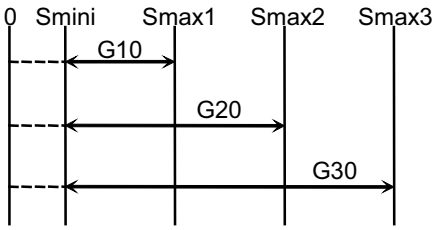
When "Spindle override method selection" signal is set to "file register method", override can be exerted on the spindle rotation speed besides the code method override (SP1 to SP4). Override can be exerted within range of 0% to 200% (1% increment). The value is set in the file register (R) in binary.

[Operation]

When this function is used, the true spindle speed is obtained by multiplying the originally set spindle speed by override ratio set with this signal.

Clamp spindle speed is the maximum or minimum speed set with parameters, which depends on "Spindle gear selection code 1,2" signal (GI1, GI2).

Even when spindle speed exceeds the maximum or minimum speed at the currently selected gear stage, due to change of override setting, "Spindle gear shift" signal (GR1, GR2) does not automatically change.



Applicable override range at gear stage 3

GR10 : Applicable override range at gear stage
GR20 : Applicable override range at gear stage
GR30 : Applicable override range at gear stage
Smini : Minimum spindle speed (parameter)
Smax1: Maximum spindle speed at gear stage 1 (parameter)
Smax2: Maximum spindle speed at gear stage 2 (parameter)
Smax3: Maximum spindle speed at gear stage 3 (parameter)

(Note) Override is not valid (100%) under the following condition:

(1) "Spindle stop" signal (SSTP) is ON.
(2) During tapping mode.
(3) During thread cutting.

[Related signals]

(1) Spindle speed override code m (SPn: Y1888)
(2) Spindle override method selection (SPS: Y188F)
(3) Spindle gear selection code 1,2 (GI1, GI2: Y1890, Y1891)
(4) Spindle stop (SSTP: Y1894)
(5) Spindle gear shift (SSFT: Y1895)
(6) Spindle orientation (SORC: Y1896)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	MULTI-POINT ORIENTATION POSITION DATA		R7009	R7059	R7109	R7159	R7209	R7259	R7309	R7359

[Function]

This signal, having the following two functions, is issued in respect to the high-speed serial connection specification spindle controller (spindle drive).

(1) Notification of orientation position to control unit (spindle controller) at orientation command.
Position data where the "Spindle orientation command" (ORC) is turned ON.

(2) During multi-point indexing, notification of indexing position during forward run indexing or reverse run indexing to control unit (spindle controller).
Position data where the "Spindle forward run index" (WRN), the "Spindle reverse run index" (WR1) is turned ON.

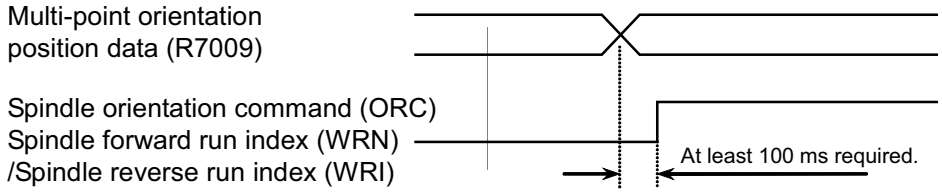
[Operation]

(1) Orientation command
The orientation position, at which the "Spindle orientation command" (ORC) turns ON, is input.
The values designated with the spindle parameter (In-position shift amount for orientation) and with "Multi-point orientation position data" signal are totaled to determine the orientation position.

(2) Multi-point indexing
Each time the "Spindle forward run index" (WRN) and "Spindle reverse run index" (WRI) turn ON, the axis rotates by the amount designated with the multi-point orientation position data.
When using MDS-D series drive unit, command value is handled as 16-bit binary data and its increment is as follows.
Command increment = 360/36000 (0.01°)

(3) Turret indexing
The turret angle is designated when the turret indexing is valid (when "#3121 tret" is set to "1").
The spindle rotation angle will be the multi-point orientation position data which is multiplied by the turret side gear ratio (in "#3122 GRC").

This signal must be validated before the "Spindle orientation command" signal turns ON (at least 100 ms before).


Multi-point orientation position data (R7009)
Spindle orientation command (ORC)
Spindle forward run index (WRN)
/Spindle reverse run index (WRI)
At least 100 ms required.

[Related signals]

(1) Spindle orientation command (ORC: Y189E)
(2) Spindle forward run index (WRN: Y189C)
(3) Spindle reverse run index (WRI: Y189D)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION REFERENCE SPINDLE SELECTION		R7016	R7066	R7116	R7166	R7216	R7266	R7316	R7366

[Function]

Select the reference spindle to be used for synchronous control from the PLC.

[Operation]

Select the spindle to be controlled as the reference spindle from the serially connected spindles.
(0: 1st spindle), 1: 1st spindle, 2: 2nd spindle, 3: 3rd spindle, 4: 4th spindle, 5: 5th spindle, 6: 6th spindle

(Note 1) If a spindle that is not serially connected is selected, spindle synchronous control will not be executed.

(Note 2) If "0" is designated, the 1st spindle will be controlled as the reference spindle.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION SYNCHRONIZED SPINDLE SELECTION		R7017	R7067	R7117	R7167	R7217	R7267	R7317	R7367

[Function]

Select the synchronized spindle to be used for synchronous control from the PLC.

[Operation]

Select the spindle to be controlled as the synchronized spindle from the serially connected spindles.

(0: 2nd spindle), 1: 1st spindle, 2: 2nd spindle, 3: 3rd spindle, 4: 4th spindle, 5: 5th spindle, 6: 6th spindle

(Note 1) If a spindle that is not serially connected is selected or if the same spindle as the reference spindle is selected, spindle synchronous control will not be executed.

(Note 2) If "0" is designated, the 2nd spindle will be controlled as the synchronized spindle.

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	SPINDLE SYNCHRONIZATION PHASE SHIFT AMOUNT		R7018	R7068	R7118	R7168	R7218	R7268	R7318	R7368

[Function]

The synchronized spindle's phase shift amount can be designated from the PLC.

[Operation]

Designate the phase shift amount for the synchronized spindle.

Unit: 360°/4096

[Related signals]

(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle phase synchronization completion (FSPPH: X18AA)
(4) Spindle synchronization (SPSY: Y18B0)
(5) Spindle phase synchronization (SPPHS: Y18B1)
(6) Spindle synchronous rotation direction (Y18B2)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Spindle oscillation amplitude		R7020	R7070	R7120	R7170	R7220	R7270	R7320	R7370

[Function]

This signal is used to set the amplitude of the spindle oscillation.

The effective setting range: 1 to 32767 [0.01°]

[Related signals]

(1) Spindle oscillation command (Y18C8)
(2) Spindle oscillation frequency (R7021)

Con-tact	Signal name	Signal ab-breviation	1stSP	2ndSP	3rdSP	4thSP	5thSP	6thSP	7thSP	8thSP
A	Spindle oscillation frequency		R7021	R7071	R7121	R7171	R7221	R7271	R7321	R7371

[Function]

This signal is used to set the frequency of the spindle oscillation.

The effective setting range: 1 to 140 [Hz]

[Related signals]

(1) Spindle oscillation command (Y18C8)
(2) Spindle oscillation amplitude (R7020)

Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis
PLC AXIS INDEXING CONTROL COMMAND 4	AUXCM4	R8050	R8056	R8062	R8068	R8074	R8080

Contact	Signal name	Signal abbreviation	bit
A	Speed override 1 to 64	OV1 to OV64	AUXCM4/bit0 to 6

[Function][Operation]

This signal designates the override value added to the selected feedrate. Set a binary value for the override. Values over 100% are regarded as 100%.

Effective feedrate = (Selected speed * Speed override) / 100

Contact	Signal name	Signal abbreviation	bit
A	Speed override valid	OVR	AUXCM4/bit7

[Function][Operation]

This is a signal to validate the speed override. When this signal is turned OFF, the set feedrate becomes the operation speed without calculating the override.

Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis
PLC AXIS INDEXING CONTROL COMMAND 3	AUXCM3	R8051	R8057	R8063	R8069	R8075	R8081

Contact	Signal name	Signal abbreviation	bit
A	Station selection 1 to 256	ST1 to ST256	AUXCM3/bit0 to 8

[Function]

This signal designates an index station No. in the automatic operation mode.

[Operation]

Set an index station No. before inputting Operation start (ST) in the automatic operation mode.

Input a 9-digit binary number. An input "000000001" corresponds to station No.1.

This signal is read in at the startup of Operation start (ST). The signal changes are ignored after the startup.

When this signal is set to "000000000" and the automatic operation is started, a one station rotation special command will result. (Note that this cannot be used when the station positions are determined in non-uniform assignments.)

Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis
PLC AXIS INDEXING CONTROL COMMAND 2	AUXCM2	R8052	R8058	R8064	R8070	R8076	R8082

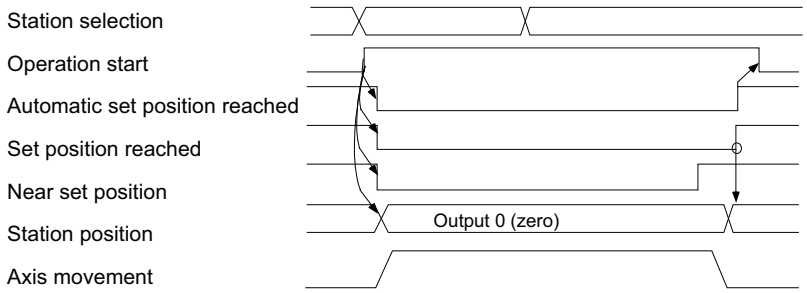
Contact	Signal name	Signal abbreviation	bit
A	Operation start	ST	AUXCM2/bit0

[Function][Operation]

When this signal is turned ON in an operation mode, the operation will start. The Operation start signal is handled as a status, so the ON status must be maintained until the operation is finished.

Operation movement in each operation mode

(1) Automatic operation mode



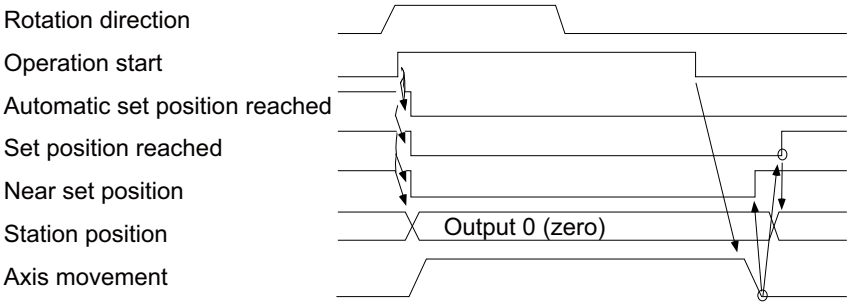
Station selection (ST1 to ST256) and Operation parameter selection (PR1, PR2) are established before inputting the Operation start signal. These two signals are read in by the startup of the Operation start signal, so they are held even if they are changed after the startup.

When the Operation start signal is input, the output signals related to the set position all turn OFF. Station position will be output as "0". When the positioning is completed, Automatic set position reached (JSTA) and Set position reached (JST) is output. Then turn the Operation start signal OFF.

When the Operation start signal is turned OFF during axis movement, the axis will stop at the nearest station. Note that for a linear axis, if there is not a nearest point in the movement direction, the commanded station becomes the nearest point.

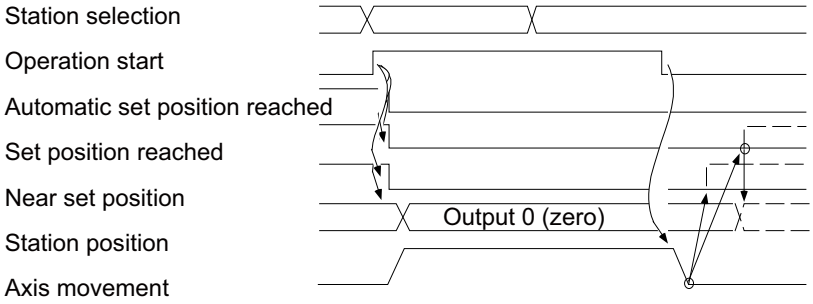
(Note) When the shortcut function is OFF for the rotating axis, the positioning direction can be designated with Rotation direction (DIR).

(2) Manual operation mode



Rotation direction (DIR) and Operation parameter selection (PR1, PR2) are established before inputting the Operation start signal. These two signals are read in by the startup of the Operation start signal, so they are held even if they are changed after the startup.
When the Operation start signal is input, the output signals related to the set position all turn OFF. Station position will be output as "0".
While the Operation start signal is ON, the rotation continues in the designated direction. When the Operation start signal is turned OFF, a positioning is carried out to the nearest station where the axis can stop in the rotation direction. Note that for a linear axis, if there is no nearest point in the movement direction, the axis will immediately decelerate to a stop.
When the positioning is completed, Set position reached (JST) is output.
(Note) Automatic set position reached (JSTA) will not be output.

(3) JOG operation mode



Rotation direction (DIR) and Operation parameter selection (PR1, PR2) are established before inputting the Operation start signal. These two signals are read in by the startup of the Operation start signal, so they are held even if they are changed after the startup.
When the Operation start signal is input, the output signals related to the set position all turn OFF. Station position will be output as "0". While the Operation start signal is ON, the rotation continues in the designated direction. When the Operation start signal is turned OFF, the axis decelerates to a stop. Set position reached (JST) and Near set position (NEAR) are output if the axis is stopped within each tolerable width from the station position.

Con-tact	Signal name	Signal ab-breviation	bit
A	Rotation direction	DIR	AUXCM2/bit1

[Function]

This signal designates the rotation direction of the operation in each operation mode.

[Operation]

Turn this signal ON to designate the rotation direction before inputting the Operation start (ST) signal.
This signal is invalid in the automatic operation mode when the shortcut control is set and selected by the parameter.
When the shortcut control is not selected, a positioning is carried out in the direction designated by this signal.
This signal is read in at the startup of Operation start (ST). The signal changes are ignored after the startup.

DIR	Axis rotation direction	Station movement direction
0	Forward run	Direction of increasing station No.
1	Reverse run	Direction of decreasing station No.

The actual motor rotation direction is reversed by changing the setting of parameter "#1018 ccw".

[Related signals]

(1) Operation start (ST: AUXCM2/bit0)

Con-tact	Signal name	Signal ab-breviation	bit
A	Arbitrary point feed command valid	STS	AUXCM2/bit2

[Function][Operation]

This signal selects the mode that executes the positioning, with the command unit specified by "#1005 plcunit", to the arbitrary position (coordinate) transferred from the NC. Automatic operation mode (AUT) must be turned ON simultaneously with Arbitrary point feed command valid.

[Related signals]

(1) Automatic operation mode (AUT: AUXCM1/bit8)

Con-tact	Signal name	Signal ab-breviation	bit
A	Incremental feed magnification 1, 2	MP1,MP2	AUXCM2/bit4,5

[Function][Operation]

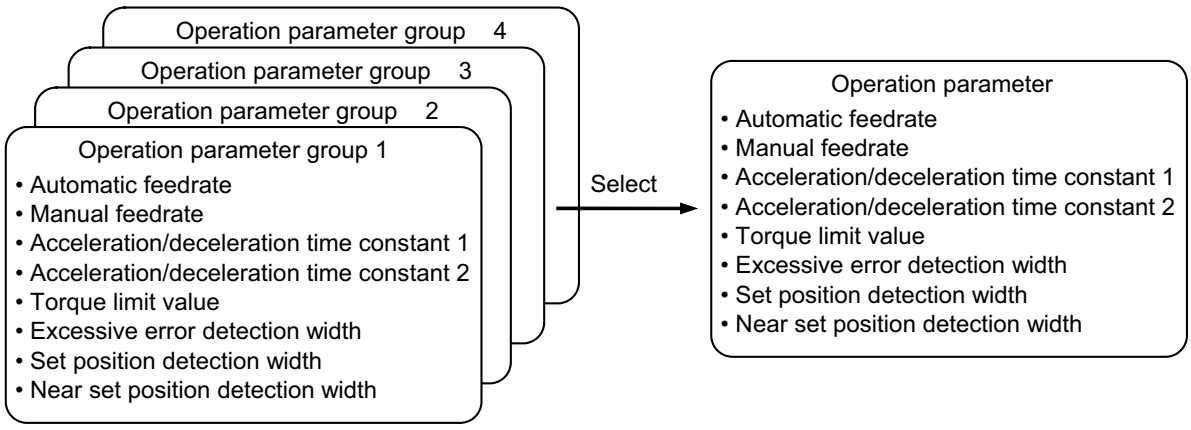
This signal selects the incremental feed amount and the handle feed magnification. In the handle feed, the movement amount per handle pulse is selected.

MP2	MP1	Feed amount
0	0	0.001°
0	1	0.01°
1	0	0.1°
1	1	1°

Con-tact	Signal name	Signal ab-breviation	bit
A	Operation parameter selection 1, 2	PR1,PR2	AUXCM2/bit6,7

[Function][Operation]

This signal selects one parameter group to be actually used from four parameter groups that designate the axis feed operation. The parameter group cannot be changed while Operation start (ST) is ON. (The group is held in NC.)
If Smoothing zero is confirmed for the target axis, the operation parameter group can be changed with the Operation start. Changing the parameter setting values of the time constant, torque limit value and excessive error detection width, however, is not possible unless Smoothing zero is confirmed for all the NC axes. The parameter values, if changed during the NC axis movement, are valid after the smoothing zero is confirmed.


Operation parameter group 4
Operation parameter group 3
Operation parameter group 2
Operation parameter group 1
• Automatic feedrate
• Manual feedrate
• Acceleration/deceleration time constant 1
• Acceleration/deceleration time constant 2
• Torque limit value
• Excessive error detection width
• Set position detection width
• Near set position detection width
Select
Operation parameter
• Automatic feedrate
• Manual feedrate
• Acceleration/deceleration time constant 1
• Acceleration/deceleration time constant 2
• Torque limit value
• Excessive error detection width
• Set position detection width
• Near set position detection width

PR2	PR1	Selected operation parameter group
0	0	1
0	1	2
1	0	3
1	1	4

Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis
PLC AXIS INDEXING CONTROL COMMAND 1	AUXCM1	R8053	R8059	R8065	R8071	R8077	R8083

Contact	Signal name	Signal abbreviation	bit
B	Servo OFF	*SVF	AUXCM1/bit0

[Function][Operation]

When the Servo OFF signal is set to "0" (B contact), the control axis enters the servo OFF status. No matter which operation mode the servo is in and turned OFF, the axis movement will stop, and the servo will turn OFF. The axis movement restarts when the servo is turned ON again.

If the axis moves for any reason while the servo is OFF, it can be selected whether to compensate that movement amount when the servo turns ON the next time. Select with parameter "#1064 svof".

(1) When carrying out movement amount compensation (#1064 svof = 1)
When the servo is OFF, the coordinates are always updated by the amount the axis has moved. When the servo is OFF, the coordinates show the machine position.

(2) When not carrying out movement amount compensation (#1064 svof = 0)
When the servo is OFF, the coordinates are not updated even when the axis moves. When the servo is OFF, the coordinates show the machine position when the servo is OFF.
When the servo is turned ON, the axis is moved to the position where the servo was turned OFF.
When the servo is OFF and the axis movement exceeds the excessive error width (designated with parameter "#2226 SV026"), a servo alarm occurs.

[Caution]

(1) The actual servo OFF operation is validated after In-position (INP) is completed. When using a mechanical clamp, carry out the clamp operation after confirming the in-position status.

(2) When the power is turned ON, the Servo OFF signal turns OFF ("0") and the servo OFF function becomes valid. It is necessary before operation to turn the Servo OFF signal ON ("1") in the PLC program to release the servo OFF.

Contact	Signal name	Signal abbreviation	bit
A	Master reset	MRST	AUXCM1/bit3

[Function]

This signal resets the PLC indexing axis.

[Operation]

When this signal is ON, the following reset operations are carried out.

(1) The axis movement decelerates to a stop.
(2) Alarms that can be released by the reset are released.
(3) The In reset (RST) signal is output.
(4) The operation alarm is released while resetting.

[Related signals]

(1) In reset (RST: AUXST1/bit9)

Contact	Signal name	Signal abbreviation	bit
A	Interlock+	*IT+	AUXCM1/bit4

[Function][Operation]

When the control axis is moving in the (+) direction, this signal decelerates and stops the axis movement immediately. When this signal is OFF from before movement, the motion is stopped in the same manner as without starting. In any case the movement is started or restarted by turning this signal ON.

Contact	Signal name	Signal abbreviation	bit
A	Interlock-	*IT-	AUXCM1/bit5

[Function][Operation]

This is the same as the Interlock + (IT+) signal, the only difference being the direction.

Con-tact	Signal name	Signal ab-breviation	bit
A	Ready OFF	RDF	AUXCM1/bit6

[Function]

This is a signal to turn OFF the READY status.

[Operation]

When put into a READY OFF status, the power supply to the servomotor is shut off, and the contactor control output is simultaneously turned OFF. If the motor is in operation, it will stop by a dynamic brake stop or a deceleration control stop. Servo ready completion (SA) and Servo ready (RDY) are also turned OFF, but an alarm does not occur. When this signal is turned OFF, the machine immediately returns to the original state.

[Related signals]

(1) Servo ready completion (SA: AUXST1/bitC)
(2) Servo ready (RDY: AUXST1/bit0)

Con-tact	Signal name	Signal ab-breviation	bit
A	Handle feed operation mode	H	AUXCM1/bit7

[Function]

This signal selects the handle feed operation mode.

[Operation]

The axis will move for the amount determined by input pulse multiplied by feed magnification after this signal is turned ON, each signal [Operation parameter selection (PR1, PR2) and Incremental feed magnification (MP1, MP2)] is determined, and the handle pulse is input.

[Caution]

(1) Turning this signal ON when other operation modes are ON will result in the operation alarm "M01 0101 Aux ax no operation mode".
(2) The handle mode acceleration/deceleration time is the acceleration/deceleration time constant 2 linear acceleration/deceleration of the selected operation parameter group.

[Related signals]

(1) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)
(2) Incremental feed magnification 1, 2 (MP1, MP2: AUXCM2/bit4,5)

Con-tact	Signal name	Signal ab-breviation	bit
A	Automatic operation mode	AUT	AUXCM1/bit8

[Function]

This signal selects the automatic operation mode.

[Operation]

Turn this signal ON, set Station selection 1 to 256 (ST1 to ST256) and then turn Operation start (ST) ON to move the axis to the designated station. The shortcut control or the rotation direction can be selected with parameters.

[Caution]

Turning this signal ON when other operation modes are ON will result in the operation alarm "M01 0101 Aux ax no operation mode".

[Related signals]

(1) Rotation direction (DIR: AUXCM2/bit1)
(2) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)
(3) Station selection 1 to 256 (ST1 to ST256: AUXCM3/bit0 to 8)

Con-tact	Signal name	Signal ab-breviation	bit
A	Manual operation mode	MAN	AUXCM1/bit9

[Function]

This signal selects the manual operation mode.

[Operation]

When the rotation direction is designated and Operation start (ST) is turned ON, the axis will begin moving, and the rotation will continue in the designated direction until Operation start is turned OFF. When Operation start turns OFF, the axis will be positioned to the nearest station.

[Caution]

Turning this signal ON when other operation modes are ON will result in the operation alarm "M01 0101 Aux ax no operation mode".

[Related signals]

(1) Rotation direction (DIR: AUXCM2/bit1)

(2) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)

Con-tact	Signal name	Signal ab-breviation	bit
A	JOG operation mode	J	AUXCM1/bitA

[Function]

This signal selects the JOG operation mode.

[Operation]

When the rotation direction is designated and Operation start (ST) is turned ON, the axis will begin moving, and the rotation will continue in the designated direction until Operation start is turned OFF. Unlike the manual operation mode, when Operation start is turned OFF, the axis immediately decelerate to a stop.

[Caution]

Turning this signal ON when other operation modes are ON will result in the operation alarm "M01 0101 Aux ax no operation mode".

[Related signals]

(1) Rotation direction (DIR: AUXCM2/bit1)

(2) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)

Con-tact	Signal name	Signal ab-breviation	bit
A	Reference position return mode	ZRN	AUXCM1/bitB

[Function]

This signal selects the reference position return mode.

[Operation]

When this signal (ZRN) is turned ON, the reference position return mode is designated. To start the reference position return, turn this signal ON, select the operation parameter group, then turn ON the Operation start (ST) signal.

When the absolute position coordinate system has been established in the absolute position specifications, the high-speed return will be applied in every operation.

[Related signals]

(1) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)

Con-tact	Signal name	Signal ab-breviation	bit
A	Basic point initialization setting mode	AZS	AUXCM1/bitD

[Function]

This signal selects the mode that initializes the basic point for the absolute position detection system.

[Operation]

When this signal is turned ON, the basic point initialization setting mode is held until the NC power is turned OFF. (Cannot be canceled)

When the stopper method is selected by setting "1" to "#2049 type", the torque limit value and the excessive error detection width in the operation parameter group 4 are automatically selected.

Con-tact	Signal name	Signal ab-breviation	bit
A	Basic point setting	ZST	AUXCM1/bitE

[Function]

This signal turns ON when designating the basic point with the basic point initialization in the absolute position detection system.

[Operation]

When this signal is turned ON in the basic point initialization setting mode, the designated position is set as the absolute position basic point.

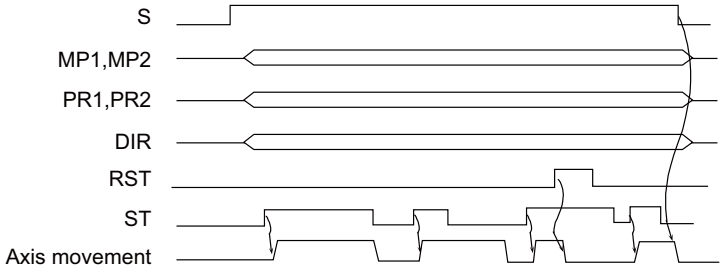
Con-tact	Signal name	Signal ab-breviation	bit
A	Incremental mode	S	AUXCM1/bitF

[Function]

This signal selects the incremental mode.

[Operation]

After turning ON this signal, designate the operation parameter group (with PR1 and PR2), the incremental feed magnification (with MP1 and MP2) and the rotation direction (with DIR). Then turn ON the Operation start (ST) signal to move the axis.



[Caution]

(1) Turning this signal ON when other operation modes are ON will result in the operation alarm "M01 0101".

(2) In the incremental mode, the axis travel will be maintained at a constant amount, even if the Operation start signal is OFF.

[Related signals]

(1) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)

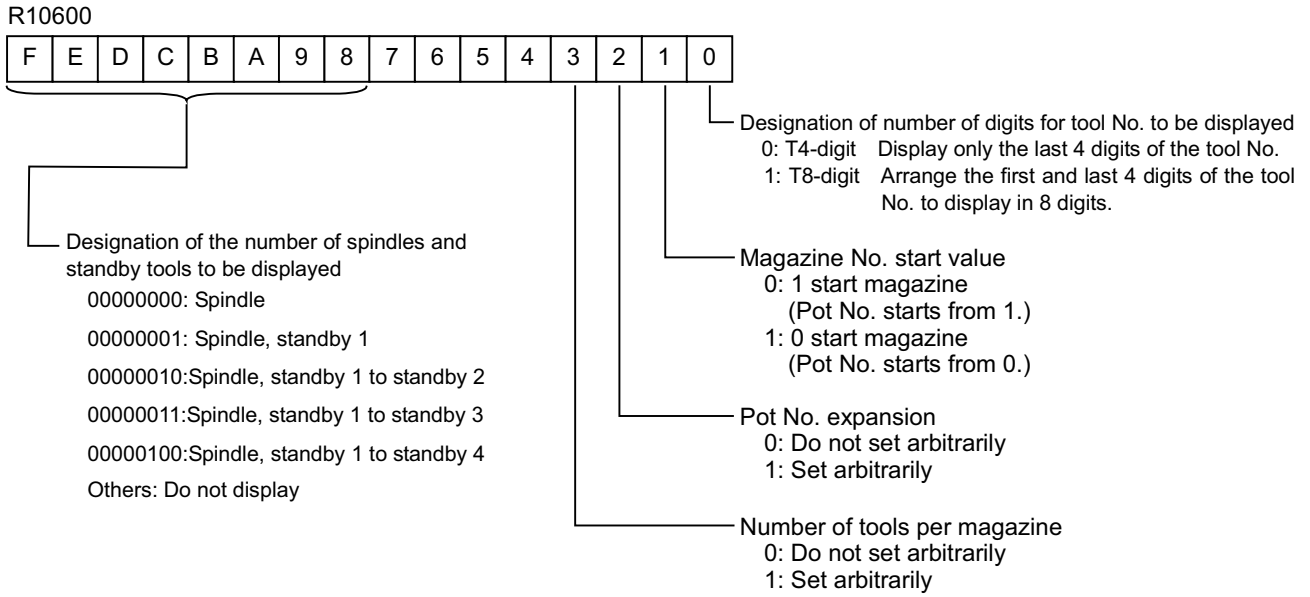
Con-tact	Signal name	Signal abbreviation	Common for part systems
A	ATC CONTROL PARAMETER		R10600

[Function]

Combination of the number of digits for tool No. to be displayed, magazine No. start value, and spindle and standby tool to be displayed are designated.

[Operation]

(1) Control parameter details


R10600
F E D C B A 9 8 7 6 5 4 3 2 1 0
Designation of number of digits for tool No. to be displayed
0: T4-digit Display only the last 4 digits of the tool No.
1: T8-digit Arrange the first and last 4 digits of the tool No. to display in 8 digits.
Designation of the number of spindles and standby tools to be displayed
00000000: Spindle
00000001: Spindle, standby 1
00000010:Spindle, standby 1 to standby 2
00000011:Spindle, standby 1 to standby 3
00000100:Spindle, standby 1 to standby 4
Others: Do not display
Magazine No. start value
0: 1 start magazine
(Pot No. starts from 1.)
1: 0 start magazine
(Pot No. starts from 0.)
Pot No. expansion
0: Do not set arbitrarily
1: Set arbitrarily
Number of tools per magazine
0: Do not set arbitrarily
1: Set arbitrarily

(2) Pot No. expansion

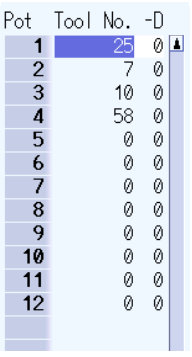
This function allows pot head No. for each magazine to be set arbitrarily.

(a) Do not set arbitrarily

The head No. for each magazine is 1 or 0, depending on the setting of ATC control parameter "magazine No. start value (R10600 bit1)".

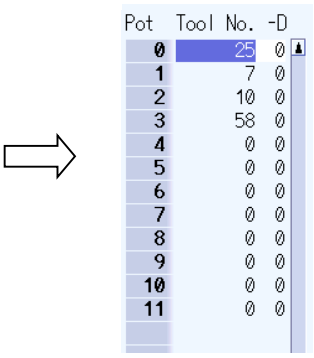
(Example 1) 1 start magazine

Set the following R registers.
R10600 : 0x0000
→ Number of digits for tool No. to be displayed : T4-digit
→ Magazine No. start value: 1 start magazine
→ Pot No. expansion : No arbitrary setting
→ Number of tools per magazine : No arbitrary setting
R10610 : 0x000C
→ Number of tools for magazine 1 : 12



(Example 2) 0 start magazine

Set the following R registers.
R10600 : 0x0002
→ Number of digits for tool No. to be displayed : T4-digit
→ Magazine No. start value: 0 start magazine
→ Pot No. expansion : No arbitrary setting
→ Number of tools per magazine : No arbitrary setting
R10610 : 0x000C
→ Number of tools for magazine 1 : 12



(b) To set arbitrarily

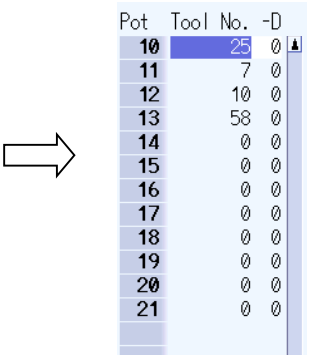
Set pot head No. for each magazine in the "each magazine pot head No. designation" register.
1st magazine pot head No. (R10695) 2nd magazine pot head No. (R10696)
3rd magazine pot head No. (R10697) 4th magazine pot head No. (R10698)
5th magazine pot head No. (R10699)

(Note 1) The head No. for each magazine is the value set in the register for "pot head No. for each magazine(R10695 to R10699)" regardless of the ATC control parameter "magazine No. start value (R10600 bit1)"

(Note 2) Numerical value 0 to 8999 can be set in the register for "pot head No. for each magazine (R10695 to R10699)". When a value outside the range is set, pot head No. is displayed from 1 or 0, depending on the setting of "magazine No. start value (R10600 bit1)".

(Example 1) Pot head No. for each magazine: 10; number of magazines: 12

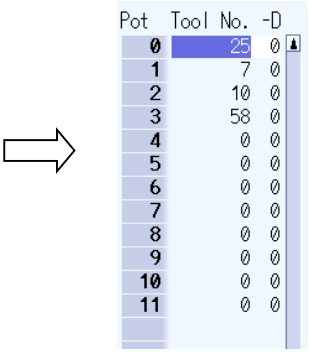
Set the following R registers.
R10600 : 0x0004
→ Number of digits for tool No. to be displayed: T4-digit
→ Magazine No. start value: 1 start magazine
→ Pot No. expansion : Arbitrary setting
→ Number of tools per magazine : No arbitrary setting
R10610 : 0x000C
→ Number of tools for magazine 1 : 12
R10695 : 0x000A
→ Pot head No. for magazine 1: 10



If the pot head No. for each magazine is outside the range of 0 to 8999, follow the setting for "magazine No. start value".

(Example 2) Pot head No. for each magazine: 9000; number of magazines: 12; magazine No. start value: 0

Set the following R registers.
R10600 : 0x0006
→ Number of digits for tool No. to be displayed : T4-digit
→ Magazine No. start value : 0 start magazine
→ Pot No. expansion : Arbitrary setting
→ Number of tools per magazine : No arbitrary setting
R10610 : 0x000C
→ Number of tools for magazine 1 : 12
R10695 : 0x2328
→ Pot head No. for magazine 1: 9000



(3) Number of tools per magazine

This function allows the number of tools per magazine to be set arbitrarily.

(a) Do not set arbitrarily

There is a maximum of three rows of magazine, and the total number of tools that can be registered per magazine is 120.

Magazine tool data assignment is fixed.

(b) To set arbitrarily

There is a maximum of five rows of magazine, and the total number of tools that can be registered for all the magazines is 360.

Set the number of tools per magazine in the "number of magazine designation" register.

(If there are any magazines not being used, set the designation register to 0.)

"Number of magazine designation" register

No.1 magazine ... R10610 No.2 magazine ... R10611

No.3 magazine ... R10612 No.4 magazine ... R10613

No.5 magazine ... R10614

The magazine tool data is assigned for the number of tools set in order from No.1 magazine.

(4) ATC file register

The file registers used with ATC are as shown below.

		Corresponding file (R) register										Remarks (Data type)
Magazine		No.1 magazine		No.2 magazine		No.3 magazine		No.4 magazine		No.5 magazine		
T4-digit/T8-digit specifications		T4-digit	T8-digit	T4-digit	T8-digit	T4-digit	T8-digit	T4-digit	T8-digit	T4-digit	T8-digit	
ATC control parameter		R10600	←	←	←	←	←	←	←	←	←	
AUX data		R10604	←	←	←	←	←	←	←	←	←	Binary (0 to 99)
Number of magazines designation		R10610	←	R10611	←	R10612	←	R10613	←	R10614	←	Binary
Pointer designation		R10615	←	R10616	←	R10617	←	R10618	←	R10619	←	Binary
Spindle tool		R10620	R10620 R10621	R10630	R10630 R10631	R10640	R10640 R10641	R10650	R10650 R10651	R10660	R10660 R10661	BCD
Standby 1 tool		R10621	R10622 R10623	R10631	R10632 R10633	R10641	R10642 R10643	R10651	R10652 R10653	R10661	R10662 R10663	BCD
Standby 2 tool		R10622	R10624 R10625	R10632	R10634 R10635	R10642	R10644 R10645	R10652	R10654 R10655	R10662	R10664 R10665	BCD
Standby 3 tool		R10623	R10626 R10627	R10633	R10636 R10637	R10643	R10646 R10647	R10653	R10656 R10657	R10663	R10666 R10667	BCD
Standby 4 tool		R10624	R10628 R10629	R10634	R10638 R10639	R10644	R10648 R10649	R10654	R10658 R10659	R10664	R10668 R10669	BCD
Spindle tool D		R10670	←	R10675	←	R10680	←	R10685	←	R10690	←	Binary
Standby 1 tool D		R10671	←	R10676	←	R10681	←	R10686	←	R10691	←	Binary
Standby 2 tool D		R10672	←	R10677	←	R10682	←	R10687	←	R10692	←	Binary
Standby 3 tool D		R10673	←	R10678	←	R10683	←	R10688	←	R10693	←	Binary
Standby 4 tool D		R10674	←	R10679	←	R10684	←	R10689	←	R10694	←	Binary
Pot head No. for each magazine		R10695	←	R10696	←	R10697	←	R10698	←	R10699	←	Binary
Magazine tool data	Pot 1 (MG1):	- Do not set arbitrarily There is a maximum of three magazines, and the maximum number of tools per magazine is 120. Magazine tool data assignment is fixed. Refer to "(4)-(a) Example of tool data assignment when not setting arbitrarily" for details. - To set arbitrarily There is a maximum of five magazines, and the total number of tools for all the magazines is 360. The tool data assignment varies between R10700 and R11779.Refer to "(4)-(b) Example of tool data assignment when setting arbitrarily" for details on assignment method.										
Magazine tool data (Aux. D)	Pot 1:											

(a) Example of tool data assignment when not setting arbitrarily
There is a maximum of three magazines, and the maximum number of tools per magazine is 120.
The tool data assignment is fixed between R10700 and R11779 as shown below.

Magazine		Corresponding file (R) register										Remarks (Data type)
		No.1 magazine		No.2 magazine		No.3 magazine		No.4 magazine		No.5 magazine		
T4-digit/T8-digit specifications		T4-digit	T8-digit	T4-digit	T8-digit	T4-digit	T8-digit	T4-digit	T8-digit	T4-digit	T8-digit	
Magazine tool data	Pot 1 (MG1)	R10700	R10700 R10701	R11060	R11060 R11061	R11420	R11420 R11421	—	—	—	—	BCD
	Pot 2 (MG2)	R10701	R10702 R10703	R11061	R11062 R11063	R11421	R11422 R11423	—	—	—	—	BCD
	Pot 3 (MG3)	R10702	R10704 R10705	R11062	R11064 R11065	R11422	R11424 R11425	—	—	—	—	BCD
	Pot 119 (MG119)	R10818	R10936 R10937	R11178	R11296 R11297	R11538	R11656 R11657	—	—	—	—	BCD
	Pot 120 (MG120)	R10819	R10938 R10939	R11179	R11298 R11299	R11539	R11658 R11659	—	—	—	—	BCD
Magazine tool data (Aux. D)	Pot 1	R10940	←	R11300	←	R11660	←	—	—	—	—	Binary
	Pot 2	R10941	←	R11301	←	R11661	←	—	—	—	—	Binary
	Pot 3	R10942	←	R11302	←	R11662	←	—	—	—	—	Binary
	Pot 119	R11058	←	R11418	←	R11778	←	—	—	—	—	Binary
	Pot 120	R11059	←	R11419	←	R11779	←	—	—	—	—	Binary

(b) Example of tool data assignment when setting arbitrarily
There is a maximum of five magazines, and the total number of tools for all the magazines is 360.
The tool data assignment varies between R10700 and R11779.
The magazine tool data is assigned for the number of tools set in order from No.1 magazine.
(Example) Number of magazines: 5 magazines
Number of tools: No.1 magazine [100 tools], No.2 to No.5 magazines [50 tools each]

		Corresponding file (R) register										Remarks (Data type)
Magazine		No.1 magazine		No.2 magazine		No.3 magazine		No.4 magazine		No.5 magazine		
T4-digit/T8-digit specifications		T4-digit	T8-digit	T4-digit	T8-digit	T4-digit	T8-digit	T4-digit	T8-digit	T4-digit	T8-digit	
Magazine tool data	Pot 1 (MG1)	R10700	R10700 R10701	R11000	R11000 R11001	R11150	R11150 R11151	R11300	R11300 R11301	R11450	R11450 R11451	BCD
	Pot 2 (MG2)	R10701	R10702 R10703	R11001	R11002 R11003	R11151	R11152 R11153	R11301	R11302 R11303	R11451	R11452 R11453	BCD
	Pot 3 (MG3)	R10702	R10704 R10705	R11002	R11004 R11005	R11152	R11154 R11155	R11302	R11304 R11305	R11452	R11454 R11455	BCD
	Pot 49 (MG49)	R10748	R10796 R10797	R11048	R11096 R11097	R11198	R11246 R11247	R11348	R11396 R11397	R11498	R11546 R11547	BCD
	Pot 50 (MG50)	R10749	R10798 R10799	R11049	R11098 R11099	R11199	R11248 R11249	R11349	R11398 R11399	R11499	R11548 R11549	BCD
	Pot 99 (MG99)	R10798	R10896 R10897	—	—	—	—	—	—	—	—	BCD
	Pot 100 (MG100)	R10799	R10898 R10899	—	—	—	—	—	—	—	—	BCD
Magazine tool data (Aux. D)	Pot 1	R10900	←	R11100	←	R11250	←	R11400	←	R11550	←	Binary
	Pot 2	R10901	←	R11101	←	R11251	←	R11401	←	R11551	←	Binary
	Pot 3	R10902	←	R11102	←	R11252	←	R11402	←	R11552	←	Binary
	Pot 49	R10948	←	R11148	←	R11298	←	R11448	←	R11598	←	Binary
	Pot 50	R10949	←	R11149	←	R11299	←	R11449	←	R11599	←	Binary
	Pot 99	R10998	←	—	—	—	—	—	—	—	—	Binary
	Pot 100	R10999	←	—	—	—	—	—	—	—	—	Binary

[Related signals]

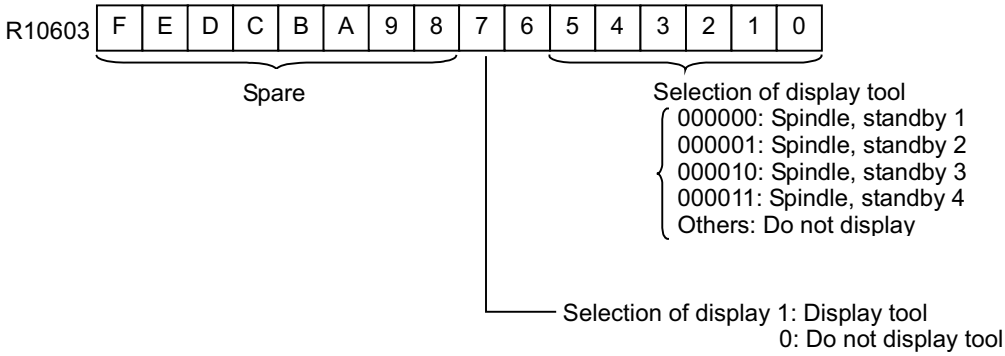
Display tool selection parameter (R10603)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	DISPLAY TOOL SELECTION PARAMETER		R10603

[Function]

Whether or not to display spindle standby is designated.

[Operation]


R10603
F E D C B A 9 8 7 6 5 4 3 2 1 0
Spare
Selection of display tool
000000: Spindle, standby 1
000001: Spindle, standby 2
000010: Spindle, standby 3
000011: Spindle, standby 4
Others: Do not display
Selection of display 1: Display tool
0: Do not display tool

[Related signals]

ATC control parameter (R10600)

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	SPINDLE TOOL NO.		R12200, 1	R12210, 1	R12220, 1	R12230, 1	R12240, 1	R12250, 1	R12260, 1	R12270, 1

[Function][Operation]

This signal indicates spindle No. in use.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	STANDBY TOOL NO.		R12202, 3	R12212, 3	R12222, 3	R12232, 3	R12242, 3	R12252, 3	R12262, 3	R12272, 3

[Function][Operation]

This signal indicates standby tool No.

Con-tact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Machining start time		R14700, 1	R14950, 1	R15200, 1	R15450, 1	R15700, 1	R15950, 1	R16200, 1	R16450, 1

[Function]

This signal displays the time at which the machining starts by the total seconds from January 1, 1970.

[Operation]

When the machining is completed, this sets the time of cycle start automatically.

The time is not set in the case of restarting after automatic operation pause (halt) or block stop.

In the case of repeating with M99, the time at which the machining is completed is set as the start time of the next cycle.

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Machining end time		R14702, 3	R14952, 3	R15202, 3	R15452, 3	R15702, 3	R15952, 3	R16202, 3	R16452, 3

[Function]

This signal displays the time at which the machining is completed by the total seconds from January 1, 1970.

[Operation]

When the M code registered to "#8001 WRK COUNT M" is executed, this sets the time of execution automatically.
If "#8001 WORK COUNT M" is 0 and when M02 or M03 is executed, this sets the time of execution automatically.
When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Program (O) number at machining start		R14704 to R14719	R14954 to R14969	R15204 to R15219	R15454 to R15469	R15704 to R15719	R15954 to R15969	R16204 to R16219	R16454 to R16469

[Function]

This signal displays the program number O at the time of the machining start.

[Operation]

When the machining is completed, this sets the ASCII code (hex number) corresponding to the program number O of that machining start automatically.
If the program name is not the O number, this will set the ASCII code (hex number) corresponding to the program name automatically.
When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: N number at machining start		R14720, 1	R14970, 1	R15220, 1	R15470, 1	R15720, 1	R15970, 1	R16220, 1	R16470, 1

[Function]

This signal displays the N number at the time of the machining start.

[Operation]

When the machining is completed, this sets the N number of that machining start automatically.
When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: B number at machining start		R14722, 3	R14972, 3	R15222, 3	R15472, 3	R15722, 3	R15972, 3	R16222, 3	R16472, 3

[Function]

This signal displays B number at the time of the machining start.

[Operation]

When the machining is completed, this sets the B number of that machining start automatically.
When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Spindle 1 maximum load		R14724	R14974	R15224	R15474	R15724	R15974	R16224	R16474

[Function]

This signal displays the Max current 1 of the spindle 1 at the time of the machining completion.

[Operation]

When the machining is completed, this automatically sets the Max current 1 of the spindle 1 displayed on the drive monitor (spindle unit).
When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Spindle 2 maximum load		R14725	R14975	R15225	R15475	R15725	R15975	R16225	R16475

[Function]

This signal displays the Max current 1 of the spindle 2 at the time of the machining completion.

[Operation]

When the machining is completed, this automatically sets the Max current 1 of the spindle 2 displayed on the drive monitor (spindle unit).

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Power consumption value		R14726, 7	R14976, 7	R15226, 7	R15476, 7	R15726, 7	R15976, 7	R16226, 7	R16476, 7

[Function]

This signal displays the power consumption value at the time of the machining completion.

[Operation]

When the machining is completed, this automatically sets the power consumption value obtained by EcoMonitorLight station #1.

When the MES interface library function is invalid or the device is not connected with EcoMonitorLight, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Power regeneration value		R14728, 9	R14978, 9	R15228, 9	R15478, 9	R15728, 9	R15978, 9	R16228, 9	R16478, 9

[Function]

This signal displays the power regeneration value at the time of machining completion.

[Operation]

When the machining is completed, this automatically sets the power regeneration value obtained by EcoMonitorLight station #1.

When the MES interface library function is invalid or the device is not connected with EcoMonitorLight, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Number of machined workpieces		R14730, 1	R14980, 1	R15230, 1	R15480, 1	R15730, 1	R15980, 1	R16230, 1	R16480, 1

[Function]

This signal displays the number of machined workpieces.

[Operation]

When the machining is completed, this automatically sets the number of machined workpieces displayed in "#8002 WRK COUNT".When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Tool number 1 to 5		R14732 to R14736	R14982 to R14986	R15232 to R15236	R15482 to R15486	R15732 to R15736	R15982 to R15986	R16232 to R16236	R16482 to R16486

[Function]

This signal displays the tool number.

[Operation]

When the machining is completed, this automatically sets the tool number.

Up to five tool number histories from the latest are set in the R registers "Tool number 1" to "Tool number 5".

The latest is set in the R register "Tool number 1".

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Tool offset number 1 to 5		R14737 to R14741	R14987 to R14991	R15237 to R15241	R15487 to R15491	R15737 to R15741	R15987 to R15991	R16237 to R16241	R16487 to R16491

[Function]

This signal displays the tool offset number.

[Operation]

When the machining is completed, this automatically sets the tool offset number.

Up to five tool offset number histories from the latest are set in the R registers "Tool offset number 1" to "Tool offset number 5".

The latest is set in the R register "Tool offset number 1".

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Tool length offset 1 to 5		R14742, 3 to R14750, 1	R14992, 3 to R15000, 1	R15242, 3 to R15250, 1	R15492, 3 to R15500, 1	R15742, 3 to R15750, 1	R15992, 3 to R16000, 1	R16242, 3 to R16250, 1	R16492, 3 to R16500, 1

[Function]

This signal displays the tool length offset.

[Operation]

When the machining is completed, this automatically sets the tool length offset.

Up to five tool length offset histories from the latest are set in the R registers "Tool length offset 1" to "Tool length offset 5".

The latest is set in the R register "Tool length offset 1".

This displays the length dimension for the machining center system, or the X axis tool length offset for the lathe system.

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Tool radius offset 1 to 5		R14752, 3 to R14760, 1	R15002, 3 to R15010, 1	R15252, 3 to R15260, 1	R15502, 3 to R15510, 1	R15752, 3 to R15760, 1	R16002, 3 to R16010, 1	R16252, 3 to R16260, 1	R16502, 3 to R16510, 1

[Function]

This signal displays the tool radius offset.

[Operation]

When the machining is completed, this automatically sets the tool radius offset.

Up to five tool radius offset histories from the latest are set in the R registers "Tool radius offset 1" to "Tool radius offset 5".

The latest is set in the R register "Tool radius offset 1".

This displays the radius dimension for the machining center system, or the tool nose R offset for the lathe system.

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Time of alarm occurrence		R14780, 1	R15030, 1	R15280, 1	R15530, 1	R15780, 1	R16030, 1	R16280, 1	R16530, 1

[Function]

This signal displays the time at which an alarm occurs by the total seconds from January 1, 1970.

[Operation]

When an alarm occurs, this automatically sets the time of alarm occurrence.

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Alarm number 1		R14782 to R14797	R15032 to R15047	R15282 to R15297	R15532 to R15547	R15782 to R15797	R16032 to R16047	R16282 to R16297	R16532 to R16547
A	MES interface library: Alarm number 2		R14798 to R14813	R15048 to R15063	R15298 to R15313	R15548 to R15563	R15798 to R15813	R16048 to R16063	R16298 to R16313	R16548 to R16563
A	MES interface library: Alarm number 3		R14814 to R14829	R15064 to R15079	R15314 to R15329	R15564 to R15579	R15814 to R15829	R16064 to R16079	R16314 to R16329	R16564 to R16579
A	MES interface library: Alarm number 4		R14830 to R14845	R15080 to R15095	R15330 to R15345	R15580 to R15595	R15830 to R15845	R16080 to R16095	R16330 to R16345	R16580 to R16595

[Function]

This signal displays the alarm numbers at the alarm occurrence.

[Operation]

When an alarm occurs, this automatically sets the latest alarm number.

Up to four alarm number histories from the latest are set in the R registers "Alarm number 1" to "Alarm number 4".

The latest is set in the R register "Alarm number 1".

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Power ON time		R14846, 7	R15096, 7	R15346, 7	R15596, 7	R15846, 7	R16096, 7	R16346, 7	R16596, 7

[Function]

This signal displays the power ON time in the seconds at the alarm occurrence.

[Operation]

When an alarm occurs, this automatically sets the power ON time.

The power ON time is the total integrated time of the time from NC power ON to OFF.

When the power ON time exceeds "59999:59:59", this is set to "215999999".

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: O number at alarm		R14848 to R14863	R15098 to R15113	R15348 to R15363	R15598 to R15613	R15848 to R15863	R16098 to R16113	R16348 to R16363	R16598 to R16613

[Function]

This signal displays the program number O at the alarm occurrence.

[Operation]

When an alarm occurs, This automatically sets the ASCII code (hex number) corresponding to the program number O of that time.

If the program name is not the O number, this will set the ASCII code (hex number) corresponding to the program name.

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: N number at alarm		R14864, 5	R15114, 5	R15364, 5	R15614, 5	R15864, 5	R16114, 5	R16364, 5	R16614, 5

[Function]

This signal displays the N number at the alarm occurrence.

[Operation]

When an alarm occurs, the N number of that time is automatically set.

When the MES interface library function is invalid, this signal is set to "0".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: B number at alarm		R14866, 7	R15116, 7	R15366, 7	R15616, 7	R15866, 7	R16116, 7	R16366, 7	R16616, 7

[Function]

This signal displays the B number at the alarm occurrence.

[Operation]

When an alarm occurs, the B number of that time is automatically set.

When the MES interface library function is invalid, this signal is set to "0".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: G code modal status		R14868 to R14899	R15118 to R15149	R15368 to R15399	R15618 to R15649	R15868 to R15899	R16118 to R16149	R16368 to R16399	R16618 to R16649

[Function]

This signal displays the G code modal status at the alarm occurrence.

[Operation]

When an alarm occurs , this automatically sets the ASCII code (hex number) corresponding to the G code modal status of that time.

The modal status of G code groups 1 to 6 is set in these registers.

When the MES interface library function is invalid, this signal is set to "0".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Spindle 1 maximum load		R14900	R15150	R15400	R15650	R15900	R16150	R16400	R16650

[Function]

This signal displays the Max current 1 of the spindle 1 at the alarm occurrence.

[Operation]

When an alarm occurs, this automatically sets the Max current 1 of the spindle 1 displayed on the drive monitor (spindle unit).

When the MES interface library function is invalid, this signal is set to "0".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Spindle 2 maximum load		R14901	R15151	R15401	R15651	R15901	R16151	R16401	R16651

[Function]

This signal displays the Max current 2 of the spindle 1 at the alarm occurrence.

[Operation]

When an alarm occurs, this automatically sets the Max current 1 of the spindle 2 displayed on the drive monitor (spindle unit).

When the MES interface library function is invalid, this signal is set to "0".

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Tool number 1		R14902	R15152	R15402	R15652	R15902	R16152	R16402	R16652

[Function]

This signal displays the tool number at the alarm occurrence.

[Operation]

When an alarm occurs, this automatically sets the tool number of that time.

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Tool offset number 1		R14903	R15153	R15403	R15653	R15903	R16153	R16403	R16653

[Function]

This signal displays the tool offset number at the alarm occurrence.

[Operation]

When an alarm occurs, this automatically sets the tool offset number of that time.

This sets the tool radius offset number for the machining center system, or the tool length offset number for the lathe system.

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Tool length offset 1		R14904, 5	R15154, 5	R15404, 5	R15654, 5	R15904, 5	R16154, 5	R16404, 5	R16654, 5

[Function]

This signal displays the tool length offset at the alarm occurrence.

[Operation]

When an alarm occurs, this automatically sets the tool length offset of that time.

This sets the length dimension for the machining center system, or the X axis tool length offset for the lathe system.

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	$1	$2	$3	$4	$5	$6	$7	$8
A	MES interface library: Tool radius offset 1		R14906, 7	R15156, 7	R15406, 7	R15656, 7	R15906, 7	R16156, 7	R16406, 7	R16656, 7

[Function]

This signal displays the tool radius offset at the alarm occurrence.

[Operation]

When an alarm occurs, this automatically sets the tool length offset of that time.

This sets the radius dimension for the machining center system, or the tool nose R offset for the lathe system.

When the MES interface library function is invalid, this signal is set to "0".

Contact	Signal name	Signal abbreviation	Common for part systems
A	EcoMonitorLight CONNECTION: READ START BIT		R20288

[Function]

This start bit executes the power value collection.

[Operation]

The power value collecting function is executed based on the setting value which has been written in R20289 to R20291 by writing 1 to Bit0.

The bit is cleared to zero in the next cycle.

Bit0 1: Start
0: Stop

This register holds the value even after the power OFF.

[Related signals]

(1) R20289 to R20291, R14400 to R14405

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	EcoMonitorLight CONNECTION: STATION NO.		R20289
A	EcoMonitorLight CONNECTION: REGISTER ADDRESS		R20290
A	EcoMonitorLight CONNECTION: SIZE OF DATA TO READ		R20291

[Function]

This register sets the information required for the power value collection.

[Operation]

The required information is set with user's ladder program.

These data is read into CNC by writing 1 to R20288.

This register holds the value even after the power OFF.

[Related signals]

(1) R20288, R14400 to R14405

Con-tact	Signal name	Signal abbre-viation	Common for part systems
A	Touchscreen operation disabled	TP_INVALID	R20480

[Function]

Touchscreen operation can be temporarily disabled by using this signal (TP_INVALD).

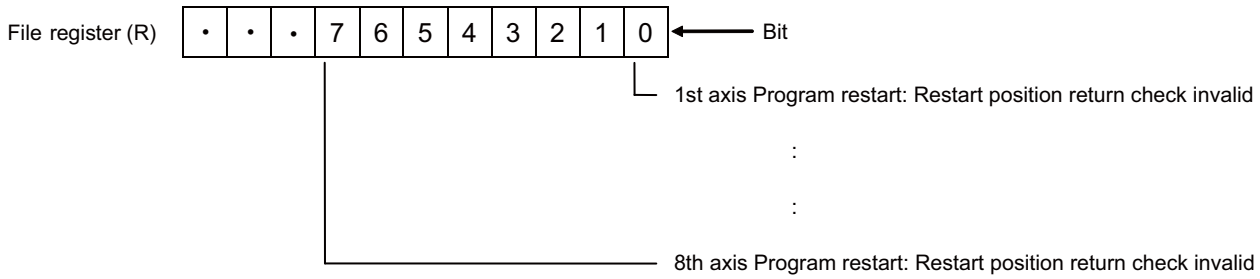
[Operation]

When you turn ON (disable) R20480 bit0, the touchscreen operation is disabled.When you change R20480 bit0 from OFF (enable) to ON (disable) with the touchscreen pressed, the touch is interpreted to be released at the time of ON. When you change R20480 bit0 from ON (disable) to OFF (enable) with the touchscreen pressed, the touch is interpreted to be made at the time of OFF.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	PROGRAM RESTART : RESTART POSITION RETURN CHECK INVALID		R22500	R22700	R22900	R23100	R23300	R23500	R23700	R23900

[Function]

This signal disables the program restart function from checking whether the axis has returned to the restart position after restart search.


File register (R)
• • • 7 6 5 4 3 2 1 0
Bit
1st axis Program restart: Restart position return check invalid
:
:
8th axis Program restart: Restart position return check invalid

[Operation]

When restarting a machining program after restart search while this signal is ON, NC will not check if the axis selected by the bit of this signal has returned to the restart position, regardless of whether the command is programmed or not. The program operation restarts at cycle start even when the said axis has not returned to the restart position.
Finish the restart search, then turn on this signal before restart the cycle. Keep this signal ON until the In automatic operation "Run" (OP: XC12) signal turns ON.

[Caution]

(1) While this signal is ON, restart position return operation is not performed on an axis for which the parameter "#1302 AutoRP" is 1 (Automatic return to restart position) and the parameter "#2082 a_rstax" is other than 0.
(2) If an axis selected by the bit of this signal is programmed while this signal is ON, the program is able to restart even when the axis is not in the restart position. This may change the tool path after the program restart. Thus before executing a cycle start, make sure that the said axis is in a position where the program is possible to restart.
(3) This signal is prepared for a specific machine tool builder.

Con-tact	Signal name	Signal ab-breviation	$1	$2	$3	$4	$5	$6	$7	$8
A	LOAD MONITOR I : CUTTING TORQUE ESTIMATION TARGET AXIS		R22692	R22892	R23092	R23292	R23492	R23692	R23892	R24092

[Function]

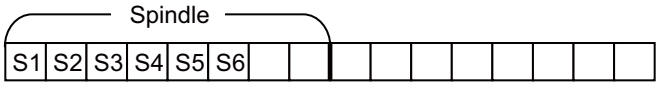
This device is used to specify which spindle to use for estimating cutting torque.

[Operation]

This signal is used to select which spindle to use for sampling in cutting torque estimation. When “Cutting torque estimation Execution” turns ON, cutting torque estimation is carried out for the spindle selected by bit of this device. The cutting torque of the spindle selected here is output.

Up to one spindle can be set in this device. Under any of the following conditions the bit B of “Load monitor Data alarm information” turns ON.

- If two or more axes are designated as the torque estimation target axis
- If you specify no axis as the torque estimation target axis



[Related signals]

(1) Load monitor I : Cutting torque estimation in progress (XCEE)
(2) Load monitor I : Cutting torque estimation completed (XCEF)
(3) Load monitor I : Cutting torque estimation execution (YCEF)
(4) Load monitor I : Data error information (R566)
(5) Load monitor I : Spindle cutting torque output value (R6528)

4.5 Explanation of Special Relays (SM***)

Con-tact	Signal name	Signal abbreviation	Common for part systems
A	TEMPERATURE RISE		SM16

[Function][Operation]

If the alarm is displayed when an overheat alarm is detected in the control unit or communication terminal, the overheat signal will be output simultaneously. If the machine is in automatic operation, the operation will be continued, but restarting will not be possible after resetting or stopping with M02/M30. (Starting will be possible after block stop or feed hold.)

For details on the operation, etc., refer to "Temperature warning cause".

⚠ CAUTION

1. If the temperature rise detection function is invalidated with the parameters, the control could be disabled when the temperature is excessive. This could result in machine damage or personal injuries due to runaway axis, and could damage the device. Enable the detection function for normal use.

[Related signals]

(1) Temperature warning cause (R57)

(2) Control unit temperature (R60)

4.6 Explanation of ZR device

4.6.1 PLC → CNC

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
B	SLS OBSERVATION REQUEST (CONTROL AXIS)	*SLSRm	ZR256 bit0	ZR256 bit1	ZR256 bit2	ZR256 bit3	ZR256 bit4	ZR256 bit5	ZR256 bit6	ZR256 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR256 bit8	ZR256 bit9	ZR256 bit10	ZR256 bit11	ZR256 bit12	ZR256 bit13	ZR256 bit14	ZR256 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR257 bit0	ZR257 bit1	ZR257 bit2	ZR257 bit3	ZR257 bit4	ZR257 bit5	ZR257 bit6	ZR257 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR257 bit8	ZR257 bit9	ZR257 bit10	ZR257 bit11	ZR257 bit12	ZR257 bit13	ZR257 bit14	ZR257 bit15

[Function]

This signal is used to start execution of the SLS observation function on the control axis.
This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).
(This signal is ignored when SLS is disabled by #51002 SLS_Enable.)

[Operation]

When the SLS observation request signal is turned OFF (when SLS is requested), the NC carries outthe following:
(1) Checks the SLS parameters to be used.
(2) Executes the NC's SLS observation function, and turns ON SLS observation is active (SLSEm).
(3) Turns ON the Under SLS limit (SLSSm) signal when the axis is confirmed to have decelerated to the safely-limited speed or below.

[Related signals]

(1) SLS speed change input (SLSMImn)
(2) SLS speed change output (SLSMOmn)
(3) SLS speed override input (SLSOVRImn)
(4) SLS speed override output (SLSOVROmn)
(5) SLS observation is active (SLSEm)
(6) Under SLS limit (SLSSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
B	SLP OBSERVATION REQUEST (CONTROL AXIS)	*SLPRm	ZR258 bit0	ZR258 bit1	ZR258 bit2	ZR258 bit3	ZR258 bit4	ZR258 bit5	ZR258 bit6	ZR258 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR258 bit8	ZR258 bit9	ZR258 bit10	ZR258 bit11	ZR258 bit12	ZR258 bit13	ZR258 bit14	ZR258 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR259 bit0	ZR259 bit1	ZR259 bit2	ZR259 bit3	ZR259 bit4	ZR259 bit5	ZR259 bit6	ZR259 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR259 bit8	ZR259 bit9	ZR259 bit10	ZR259 bit11	ZR259 bit12	ZR259 bit13	ZR259 bit14	ZR259 bit15

[Function]

This signal is used to start execution of the SLP observation function on the control axis.

This signal is available when SLP is enabled by the parameter (#51003 SLP_Enable).

(This signal is ignored when SLP is disabled by #51003 SLP_Enable.)

[Operation]

When the SLP observation request signal is turned OFF (when SLP is requested), the NC carries out the following:

(1) Checks the SLP parameters to be used.

(2) Executes the NC's SLP observation function, and turns ON SLP observation is active (SLPEm).

(3) Turns ON the In SLP range (SLPSm) signal when the axis is confirmed to be in the SLP position tolerance range.

[Related signals]

(1) SLP position change input (SLPMImn)

(2) SLP position change output (SLPMOmn)

(3) SLP observation is active (SLPEm)

(4) In SLP range (SLPSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
B	SSM REQUEST (CONTROL AXIS)	*SSMRm	ZR260 bit0	ZR260 bit1	ZR260 bit2	ZR260 bit3	ZR260 bit4	ZR260 bit5	ZR260 bit6	ZR260 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR260 bit8	ZR260 bit9	ZR260 bit10	ZR260 bit11	ZR260 bit12	ZR260 bit13	ZR260 bit14	ZR260 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR261 bit0	ZR261 bit1	ZR261 bit2	ZR261 bit3	ZR261 bit4	ZR261 bit5	ZR261 bit6	ZR261 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR261 bit8	ZR261 bit9	ZR261 bit10	ZR261 bit11	ZR261 bit12	ZR261 bit13	ZR261 bit14	ZR261 bit15

[Function]

This signal is used to start execution of SSM on the control axis.

This signal is available when SSM is enabled by the parameter (#51004 SSM_Enable).

(This signal is ignored when SSM is disabled by #51004 SSM_Enable.)

[Operation]

When SSM request is turned OFF (When SSM is requested), the NC carries out the following:

(1) Checks the SSM parameters to be used.

(2) Executes the NC's Safe speed monitor function, and turns ON the SSM is active (SSMEm) signal.

(3) Turns ON the Under SSM safe speed 1 to 4 (SSMSmn) signal when the axis is confirmed to be at the safe speed or below.

[Related signals]

(1) SSM is active (SSMEm)

(2) Under SSM safe speed (SSMSmn)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
B	SAFE CAM REQUEST (CONTROL AXIS)	*SCARm	ZR262 bit0	ZR262 bit1	ZR262 bit2	ZR262 bit3	ZR262 bit4	ZR262 bit5	ZR262 bit6	ZR262 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR262 bit8	ZR262 bit9	ZR262 bit10	ZR262 bit11	ZR262 bit12	ZR262 bit13	ZR262 bit14	ZR262 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR263 bit0	ZR263 bit1	ZR263 bit2	ZR263 bit3	ZR263 bit4	ZR263 bit5	ZR263 bit6	ZR263 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR263 bit8	ZR263 bit9	ZR263 bit10	ZR263 bit11	ZR263 bit12	ZR263 bit13	ZR263 bit14	ZR263 bit15

[Function]

This signal is used to start execution of the Safe cam function on the control axis.

This signal is available when SCA is enabled by the parameter (#51005 SCA_Enable).

(This signal is ignored when SCA is disabled by #51005 SCA_Enable.)

[Operation]

When the Safe cam request signal is turned OFF (When SCA is requested), the NC carries out the following:

(1) Checks the SCA parameters to be used.

(2) Executes the NC's Safe cam function and turns ON the Safe cam is active (SCAEm) signal.

(3) Outputs the safe cam position status to the Safe cam position (SCASm) signal.

[Related signals]

(1) Safe cam is active (SCAEm)

(2) Safe cam position (SCASmn)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
B	SOS OBSERVATION REQUEST (CONTROL AXIS)	*SOSRm	ZR264 bit0	ZR264 bit1	ZR264 bit2	ZR264 bit3	ZR264 bit4	ZR264 bit5	ZR264 bit6	ZR264 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR264 bit8	ZR264 bit9	ZR264 bit10	ZR264 bit11	ZR264 bit12	ZR264 bit13	ZR264 bit14	ZR264 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR265 bit0	ZR265 bit1	ZR265 bit2	ZR265 bit3	ZR265 bit4	ZR265 bit5	ZR265 bit6	ZR265 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR265 bit8	ZR265 bit9	ZR265 bit10	ZR265 bit11	ZR265 bit12	ZR265 bit13	ZR265 bit14	ZR265 bit15

[Function]

This signal is used to start execution of the SOS observation function on the control axis.

This signal is available when the parameter (#51006 SOS_Enable) is set to 1 (Enable).

(If #51006 SOS_Enable is 0 (Disable), this signal is ignored.)

[Operation]

When SOS observation request is turned OFF (When SOS is requested), the NC carries out the following:

(1) Checks the SOS parameters to be used.

(2) Executes the NC's Safe operating stop function, and turns ON the SOS is active (SOSEm) signal.

(3) Turns ON the In SOS stop (SOSSm) signal when the safe standstill state of the axis is confirmed.

[Related signals]

(1) SOS is active (SOSEm)

(2) In SOS stop (SOSSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
B	SAFE STOP 1 REQUEST (CONTROL AXIS)	*SS1Rm	ZR266 bit0	ZR266 bit1	ZR266 bit2	ZR266 bit3	ZR266 bit4	ZR266 bit5	ZR266 bit6	ZR266 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR266 bit8	ZR266 bit9	ZR266 bit10	ZR266 bit11	ZR266 bit12	ZR266 bit13	ZR266 bit14	ZR266 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR267 bit0	ZR267 bit1	ZR267 bit2	ZR267 bit3	ZR267 bit4	ZR267 bit5	ZR267 bit6	ZR267 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR267 bit8	ZR267 bit9	ZR267 bit10	ZR267 bit11	ZR267 bit12	ZR267 bit13	ZR267 bit14	ZR267 bit15

[Function]

This signal is used to start execution of Safe stop 1 on the control axis.

This signal is available when the parameter (#51007 SS1_Enable) is set to 1 (Enable).

(If #51007 SS1_Enable is 0 (Disable), this signal is ignored.)

[Operation]

When the Safe stop 1 request signal is turned OFF (When SS1 is requested), the NC carries out the following:

(1) Checks the SS1 parameters to be used.

(2) Executes the NC's Safe stop 1 function, and turns ON the SS1 is active (SS1Em) signal.

(3) Turns ON the In Safe stop 1 (SS1Sm) signal when the axis deceleration is confirmed.

[Related signals]

(1) SS1 is active (SS1Em)

(2) In Safe stop 1 (SS1Sm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
B	SAFE STOP 2 REQUEST (CONTROL AXIS)	*SS2Rm	ZR268 bit0	ZR268 bit1	ZR268 bit2	ZR268 bit3	ZR268 bit4	ZR268 bit5	ZR268 bit6	ZR268 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR268 bit8	ZR268 bit9	ZR268 bit10	ZR268 bit11	ZR268 bit12	ZR268 bit13	ZR268 bit14	ZR268 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR269 bit0	ZR269 bit1	ZR269 bit2	ZR269 bit3	ZR269 bit4	ZR269 bit5	ZR269 bit6	ZR269 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR269 bit8	ZR269 bit9	ZR269 bit10	ZR269 bit11	ZR269 bit12	ZR269 bit13	ZR269 bit14	ZR269 bit15

[Function]

This signal is used to start execution of the Safe stop 2 function on the control axis.

This signal is available when SS2 is enabled by the parameter (#51008 SS2_Enable).

(This signal is ignored when SS2 is disabled by #51008 SS2_Enable.)

[Operation]

When Safe stop 2 request is turned OFF (When SS2 is requested), the NC carries out the following:

(1) Checks the SS2 parameters to be used.

(2) Executes the NC's Safe stop 2 function, and turns ON the SS2 is active (SS2Em) signal.

(3) Executes Safe operating stop (SOS) when the axis deceleration is confirmed.

[Related signals]

(1) SS2 is active (SS2Em)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
B	SAFE TORQUE OFF REQUEST (CONTROL AXIS)	*STORm	ZR270 bit0	ZR270 bit1	ZR270 bit2	ZR270 bit3	ZR270 bit4	ZR270 bit5	ZR270 bit6	ZR270 bit7
			9th axis	10th axis	11th axis	12th axis	13th axis	14th axis	15th axis	16th axis
			ZR270 bit8	ZR270 bit9	ZR270 bit10	ZR270 bit11	ZR270 bit12	ZR270 bit13	ZR270 bit14	ZR270 bit15
			17th axis	18th axis	19th axis	20th axis	21st axis	22nd axis	23rd axis	24th axis
			ZR271 bit0	ZR271 bit1	ZR271 bit2	ZR271 bit3	ZR271 bit4	ZR271 bit5	ZR271 bit6	ZR271 bit7
			25th axis	26th axis	27th axis	28th axis	29th axis	30th axis	31st axis	32nd axis
			ZR271 bit8	ZR271 bit9	ZR271 bit10	ZR271 bit11	ZR271 bit12	ZR271 bit13	ZR271 bit14	ZR271 bit15

[Function]

This signal is used to start execution of the Safe torque off function on the control axis.

This signal is available when STO is enabled by the parameter (#51009 STO_Enable).

(This signal is ignored when STO is disabled by #51009 STO_Enable.)

[Operation]

When the Safe torque off request signal is turned OFF (When STO is requested), the NC carries out the following:

(1) Checks the STO parameters to be used.

(2) Executes the NC's Safe torque off function, and turns ON the STO is active (STOEm) signal.

(3) Turns ON the In Safe torque off signal (STOSm) when the main drive power to the axis has been shut OFF.

[Related signals]

(1) STO is active (STOEm)

(2) In Safe torque off (STOSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
B	SBC MOTOR BRAKE STARTING REQUEST (CONTROL AXIS)	*SBCRm	ZR272 bit0	ZR272 bit1	ZR272 bit2	ZR272 bit3	ZR272 bit4	ZR272 bit5	ZR272 bit6	ZR272 bit7
			9th axis	10th axis	11th axis	12th axis	13th axis	14th axis	15th axis	16th axis
			ZR272 bit8	ZR272 bit9	ZR272 bit10	ZR272 bit11	ZR272 bit12	ZR272 bit13	ZR272 bit14	ZR272 bit15
			17th axis	18th axis	19th axis	20th axis	21st axis	22nd axis	23rd axis	24th axis
			ZR273 bit0	ZR273 bit1	ZR273 bit2	ZR273 bit3	ZR273 bit4	ZR273 bit5	ZR273 bit6	ZR273 bit7
			25th axis	26th axis	27th axis	28th axis	29th axis	30th axis	31st axis	32nd axis
			ZR273 bit8	ZR273 bit9	ZR273 bit10	ZR273 bit11	ZR273 bit12	ZR273 bit13	ZR273 bit14	ZR273 bit15

[Function]

This signal executes the motor brake start by Safety Brake Control.

This signal can be used only when the parameter #51010 SBC_Enable is set enabled.

(This signal is ignored when #51010 SBC_Enable is set disabled.)

[Operation]

By turning OFF (requesting) this signal, NC outputs the Motor brake starting request to the drive unit.

When the motor brake starts, the In SBC Motor brake start signal (SBCSm) turns ON.

When the power is shut OFF (at Safety related error, at the *STORm signal OFF, and the *SS1Rm signal OFF), it automatically carries out the motor brake start. In the case of starting the motor brake independently, turn this signal OFF.

[Caution]

Turning OFF this signal to the axis which is using the motor without embedded brake will be ignored.

[Related signals]

(1) Safe torque off request (*STORm)

(2) Safe stop 1 request (*SS1Rm)

(3) In SBC Motor brake enabled (*SBCEm)

(4) In SBC Motor brake start (SBCSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	EXTERNAL BRAKE SBT START(CONTROL AXIS)	SBTSTEXm	ZR274 bit0	ZR274 bit1	ZR274 bit2	ZR274 bit3	ZR274 bit4	ZR274 bit5	ZR274 bit6	ZR274 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR274 bit8	ZR274 bit9	ZR274 bit10	ZR274 bit11	ZR274 bit12	ZR274 bit13	ZR274 bit14	ZR274 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR275 bit0	ZR275 bit1	ZR275 bit2	ZR275 bit3	ZR275 bit4	ZR275 bit5	ZR275 bit6	ZR275 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR275 bit8	ZR275 bit9	ZR275 bit10	ZR275 bit11	ZR275 bit12	ZR275 bit13	ZR275 bit14	ZR275 bit15

[Function]

This signal is for executing the test of external brake that uses Safety Brake Control.

This signal can be used only when the parameter #51010 SBC_Enable is set enabled and #51186 SBTEX_Enable is set enabled.

(This signal is ignored when the parameter #51010 SBC_Enable is set disabled, or #51186 SBTEX_Enable is set disabled.)

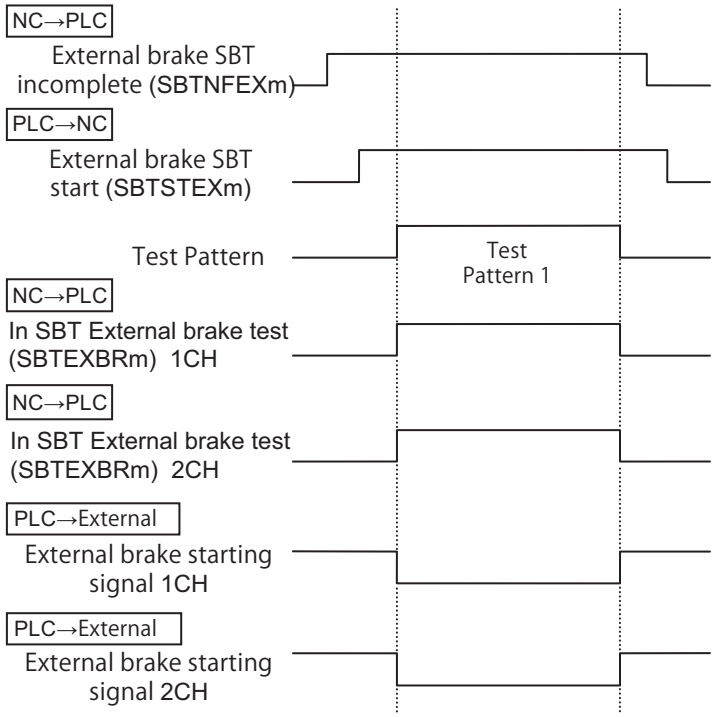
[Operation]

When turning ON the NC, and after the elapse of a certain period of time since the last brake test (parameter #51011 SBT_INT), the External brake SBT incomplete signal (SBTNFEXm) turns ON as the warning.

Turn ON SBTSTEXm and execute the brake test, and when the test completes successfully,SBTNFEXm will be OFF.

The test can be temporarily stopped by turning OFF the SBTSTEXm during the test.

After the temporary stop, the test can be resumed by turning ON the SBTSTEXm.



[Caution]

When SBTSTEXm is turned ON without meeting the following conditions, the warning “V51 0001 SBT start disabled” occurs and the brake test does not start.

(Condition 1) All part systems are not in automatic operation.
(Condition 2) The target axis for the test is in in-position.
(Condition 3) The target axis is in servo ON state.
(Condition 4) The target axis is not in current limit.
(Condition 5) The target axis is not the secondary axis in the synchronous control.
(Condition 6) The target axis is not in superimposition control.
(Condition 7) There is no axis which is in arbitrary axis exchange control within the part system to which target axis belongs.
(Condition 8) There is no axis which is in mixed control within the part system to which target axis belongs.
(Condition 9) The parameter #51191 SBT current limit value of target axis is not 0.
(Condition 10) The parameter #51193 SBT movement command amount of target axis is not 0.
(Condition 11) The parameter #51194 SBT command speed of target axis is not 0.
(Condition 12) The parameter #51188 SBT external brake starting signal’s CH number of target axis is not 0.
(Condition 13) The reference position establishment signal of target axis is ON.

[Related signals]

(1) External brake SBT Incomplete (SBTNFEXm)
(2) In SBT External brake test (SBTEXBRm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	MOTOR BRAKE SBT START (CONTROL AXIS)	SBTSTMOm	ZR276 bit0	ZR276 bit1	ZR276 bit2	ZR276 bit3	ZR276 bit4	ZR276 bit5	ZR276 bit6	ZR276 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR276 bit8	ZR276 bit9	ZR276 bit10	ZR276 bit11	ZR276 bit12	ZR276 bit13	ZR276 bit14	ZR276 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR277 bit0	ZR277 bit1	ZR277 bit2	ZR277 bit3	ZR277 bit4	ZR277 bit5	ZR277 bit6	ZR277 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR277 bit8	ZR277 bit9	ZR277 bit10	ZR277 bit11	ZR277 bit12	ZR277 bit13	ZR277 bit14	ZR277 bit15

[Function]

This signal is for executing the test of motor brake that uses Safety Brake Control.

This signal can be used only when the parameter #51010 SBC_Enable is set enabled and #51187 SBTMO_Enable is set enabled.

(This signal is ignored when the parameter #51010 SBC_Enable is set disabled, or #51187 SBTMO _Enable is set disabled.)

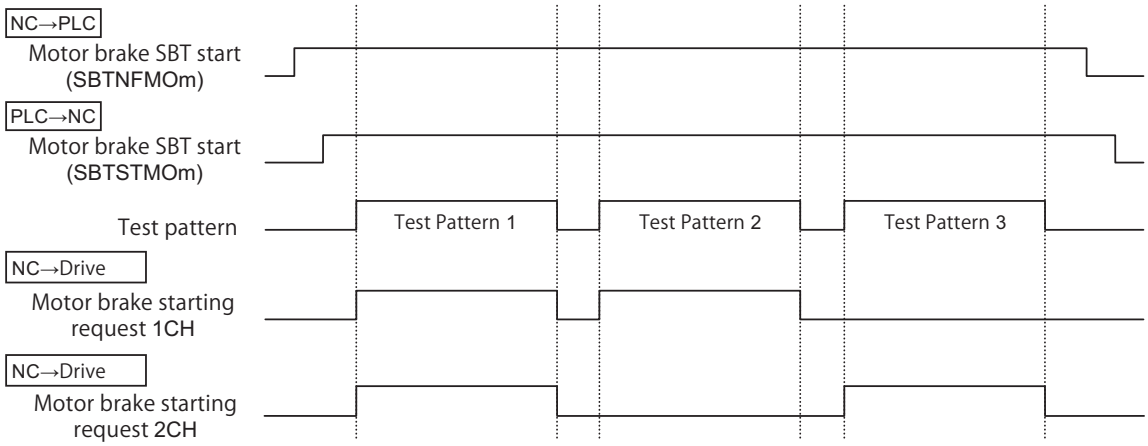
[Operation]

When turning ON the NC, and after the elapse of a certain period of time since the last brake test (parameter #51011 SBT_INT), the Motor brake SBT incomplete signal (SBTNFMOm) turns ON as the warning.

Turn ON SBTSTMOm and execute the brake test, and when the test completes successfully, SBTNFMOm will be OFF.

The test can be temporarily stopped by turning OFF the SBTSTMOm during the test.

After the temporary stop, the test can be resumed from the test pattern1 by turning ON the SBTSTMOm.



[Caution]

When SBTSTMOm is turned ON without meeting the following conditions, the warning “V51 0001 SBT start disabled” occurs and the brake test does not start.

(Condition 1) All part systems are not in automatic operation.

(Condition 2) The target axis for the test is in in-position.

(Condition 3) The target axis is in servo ON state.

(Condition 4) The target axis is not in current limit.

(Condition 5) The target axis is not the secondary axis in the synchronous control.

(Condition 6) The target axis is not in superimposition control.

(Condition 7) There is no axis which is in arbitrary axis exchange control within the part system to which target axis belongs.

(Condition 8) There is no axis which is in mixed control within the part system to which target axis belongs.

(Condition 9) The parameter #51191 SBT current limit value of target axis is not 0.

(Condition 10) The parameter #51193 SBT movement command amount of target axis is not 0.

(Condition 11) The parameter #51194 SBT command speed of target axis is not 0.

(Condition 12) The parameter #51188 SBT external brake starting signal’s CH number of target axis is not 0.

(Condition 13) The reference position establishment signal of target axis is ON.

[Related signals]

(1) Motor brake SBT incomplete (SBTNFMOm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SAFETY ABSOLUTE POSITION CONFIRM (CONTROL AXIS)	SFABSPFXm	ZR278 bit0	ZR278 bit1	ZR278 bit2	ZR278 bit3	ZR278 bit4	ZR278 bit5	ZR278 bit6	ZR278 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR278 bit8	ZR278 bit9	ZR278 bit10	ZR278 bit11	ZR278 bit12	ZR278 bit13	ZR278 bit14	ZR278 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR279 bit0	ZR279 bit1	ZR279 bit2	ZR279 bit3	ZR279 bit4	ZR279 bit5	ZR279 bit6	ZR279 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR279 bit8	ZR279 bit9	ZR279 bit10	ZR279 bit11	ZR279 bit12	ZR279 bit13	ZR279 bit14	ZR279 bit15

[Function]

This signal is used to cancel the alarm “Safe absol. posn unestablished” and establish the safety absolute position in SLP/SCA encoder diagnosis during power OFF.

[Operation]

When the “Safe absol. posn unestablished” alarm is occurring, turning ON this signal will cancel the alarm and bring it to the safety absolute position established state (the In safety position establishing signal is ON.).

By establishing the safety absolute position, the observation with SLP and the signal output with SCA is possible.

(SLP/SCA will not operate while “Safe absol. posn unestablished” alarm is occurring.)

[Caution]

This alarm is to show that users checked the correctness of the absolute position. Before turning ON this signal, move the axis by manual operation to the position where the coordinate value is clear (the position that is marked or the reference position etc.)

(When in the relative position detection system, operate the reference position return.) then compare the actual position and the displayed position to confirm the both position is corresponding.

[Related signals]]

(1) In safety absolute position establishing (Control axis) (SFABSPESTm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SAFETY RESET (CONTROL AXIS)	SRSTm	ZR280 bit0	ZR280 bit1	ZR280 bit2	ZR280 bit3	ZR280 bit4	ZR280 bit5	ZR280 bit6	ZR280 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR280 bit8	ZR280 bit9	ZR280 bit10	ZR280 bit11	ZR280 bit12	ZR280 bit13	ZR280 bit14	ZR280 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR281 bit0	ZR281 bit1	ZR281 bit2	ZR281 bit3	ZR281 bit4	ZR281 bit5	ZR281 bit6	ZR281 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR281 bit8	ZR281 bit9	ZR281 bit10	ZR281 bit11	ZR281 bit12	ZR281 bit13	ZR281 bit14	ZR281 bit15

[Function]

This signal is used to reset the alarm for the control axis's safety function.

When the alarm for the safety function is not occurring, this signal is ignored.

[Operation]

By turning ON this signal, the NC carries out the following.

(1) Check whether the occurring alarm for safety function is in the state that is possible to cancel*.

* The alarm is possible to cancel in any of the following status.

- When the function corresponding to the occurring alarm (SLS/SLP/SOS/SS1/SS2) are enabled, the function enabled is determined to be in safety status. (In Safely-limited speed/ In Safely-limited position/ In Safe operating stop/ In Safe stop 1 are ON. (The safety status of SS2 is determined by In Safe operating stop.))
- The function corresponding to the occurring alarm is (SLS/SLP/SOS/SS1/SS2) is disabled. (The request signal is OFF.)

(2) Cancel the alarm after the check proves the alarm status is possible to cancel.

(3) Turn back the drive power ON.

[Caution]

When the safety functions alarm, including the parameter error, are not in state that to be canceled, (In Safely-limited speed/ In Safely-limited position/ In Safe operating stop/ In Safe stop 1 are OFF in enabled SLS, SLP, SOS, SS1, and SS2), the alarm will not be canceled even when this signal is turned ON. (This signal will be ignored.)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SLS SPEED CHANGE IN-PUT (CONTROL AXIS)	SLSMImn	ZR312	ZR313	ZR314	ZR315	ZR316	ZR317	ZR318	ZR319
			9th axis	10th axis	11th axis	12th axis	13th axis	14th axis	15th axis	16th axis
			ZR320	ZR321	ZR322	ZR323	ZR324	ZR325	ZR326	ZR327
			17th axis	18th axis	19th axis	20th axis	21st axis	22nd axis	23rd axis	24th axis
			ZR328	ZR329	ZR330	ZR331	ZR332	ZR333	ZR334	ZR335
			25th axis	26th axis	27th axis	28th axis	29th axis	30th axis	31st axis	32nd axis
			ZR336	ZR337	ZR338	ZR339	ZR340	ZR341	ZR342	ZR343

[Function]

This signal specifies the SLS speed tolerance to be used for the SLS observation function.
This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).
(This signal is ignored when SLS is disabled by #51002 SLS_Enable.)

SLS speed input selection method

SLS speed change input		No. of step to be selected	Corresponding SLS speed tolerance parameter
Bit1	Bit0		
0	0	1	#51103 SLS_Speed1
0	1	2	#51104 SLS_Speed2
1	0	3	#51105 SLS_Speed3
1	1	4	#51106 SLS_Speed4

[Operation]

When this signal is changed, SLS speed change output (SLSMOmn) is also changed.
(SLSMOmn is changed even though SLS observation request (*SLSRm) is ON (when SLS is not requested).)

[Related signals]

(1) SLS speed change output (SLSMOmn)
(2) SLS speed override input (SLSOVRImn)
(3) SLS speed override output (SLSOVROmn)
(4) SLS observation request (*SLSRm)
(5) SLS observation is active (SLSEm)
(6) Under SLS limit (SLSSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SLS SPEED OVERRIDE INPUT (CONTROL AXIS)	SLSOVRImn	ZR312	ZR313	ZR314	ZR315	ZR316	ZR317	ZR318	ZR319
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR320	ZR321	ZR322	ZR323	ZR324	ZR325	ZR326	ZR327
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR328	ZR329	ZR330	ZR331	ZR332	ZR333	ZR334	ZR335
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR336	ZR337	ZR338	ZR339	ZR340	ZR341	ZR342	ZR343

[Function]

This signal specifies the SLS speed override to be used for the SLS observation function.
This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).
(This signal is ignored when SLS is disabled by #51002 SLS_Enable.)

SLS speed override selection method

SLS speed override input				No. of step to be selected	Corresponding SLS speed override parameter
Bit7	Bit6	Bit5	Bit4		
0	0	0	0	1	#51107 SLS_Override1
0	0	0	1	2	#51108 SLS_Override2
0	0	1	0	3	#51109 SLS_Override3
0	0	1	1	4	#51110 SLS_Override4
0	1	0	0	5	#51111 SLS_Override5
0	1	0	1	6	#51112 SLS_Override6
0	1	1	0	7	#51113 SLS_Override7
0	1	1	1	8	#51114 SLS_Override8
1	0	0	0	9	#51115 SLS_Override9
1	0	0	1	10	#51116 SLS_Override10
1	0	1	0	11	#51117 SLS_Override11
1	0	1	1	12	#51118 SLS_Override12
1	1	0	0	13	#51119 SLS_Override13
1	1	0	1	14	#51120 SLS_Override14
1	1	1	0	15	#51121 SLS_Override15
1	1	1	1	16	#51122 SLS_Override16

[Operation]

When this signal is changed, SLS speed override output (SLSOVROmn) is also changed.
(SLSOVROmn is changed even though SLS observation request (*SLSRm) is ON (when SLS is not requested).)

[Related signals]

(1) SLS speed change input (SLSMImn)
(2) SLS speed change output (SLSMOmn)
(3) SLS speed override output (SLSOVROmn)
(4) SLS observation request (*SLSRm)
(5) SLS observation is active (SLSEm)
(6) Under SLS limit (SLSSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SLP POSITION CHANGE INPUT (CONTROL AXIS)	SLPMImn	ZR344	ZR345	ZR346	ZR347	ZR348	ZR349	ZR350	ZR351
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR352	ZR353	ZR354	ZR355	ZR356	ZR357	ZR358	ZR359
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR360	ZR361	ZR362	ZR363	ZR364	ZR365	ZR366	ZR367
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR368	ZR369	ZR370	ZR371	ZR372	ZR373	ZR374	ZR375

[Function]

This signal specifies the SLP position tolerance to be used for the SLP observation function.
This signal is available when SLP is enabled by the parameter (#51003 SLP_Enable).
(This signal is ignored when SLP is disabled by #51003 SLP_Enable.)

SLP position input selection method

SLP position change input		No. of step to be selected	Corresponding SLP position tolerance parameter
Bit1	Bit0		
0	0	1	#51126/51127 SLP_Position(P/M)1
0	1	2	#51128/51129 SLP_Position(P/M)2
1	0	3	#51130/51131 SLP_Position(P/M)3
1	1	4	#51132/51133 SLP_Position(P/M)4

[Operation]

When this signal is changed, SLP position change output (SLPMOmn) is also changed.
(SLPMOmn is changed even though SLP observation request (*SLPRm) is ON (when SLP is not requested).)

[Related signals]

(1) SLP position change output (SLPMOmn)
(2) SLP observation request (*SLPRm)
(3) SLP observation is active (SLPEm)
(4) In SLP range (SLPSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
B	SLS OBSERVATION RE-QUEST (SPINDLE)	*SLSSRm	ZR440 bit0	ZR440 bit1	ZR440 bit2	ZR440 bit3	ZR440 bit4	ZR440 bit5	ZR440 bit6	ZR440 bit7

[Function]

This signal starts execution of the SLS observation function on the spindle.

This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).

(This signal is ignored when SLS is disabled by #51002 SLS_Enable.)

[Operation]

When the SLS observation request signal is turned OFF (when SLS is requested), the NC carries out the following:

(1) Checks the SLS parameters to be used.

(2) Executes the NC's SLS observation function, and turns ON SLS observation is active (SLSSEm).

(3) Turns ON the Under SLS limit (SLSSSm) signal when the spindle is confirmed to have decelerated to the safely-limited speed or lower.

[Related signals]

(1) SLS speed change input (SLSSMImn)

(2) SLS speed change output (SLSSMOmn)

(3) SLS speed override input (SLSSOVRImn)

(4) SLS speed override output (SLSSOVROmn)

(5) SLS observation is active (SLSSEm)

(6) Under SLS limit (SLSSSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
B	SSM REQUEST (SPINDLE)	*SSMSRm	ZR442 bit0	ZR442 bit1	ZR442 bit2	ZR442 bit3	ZR442 bit4	ZR442 bit5	ZR442 bit6	ZR442 bit7

[Function]

This signal is used to start execution of the Safe speed monitor function on the control axis.

This signal is available when SSM is enabled by the parameter (#51004 SSM_Enable).

(This signal is ignored when SSM is disabled by #51004 SSM_Enable.)

[Operation]

When SSM request is turned OFF (When SSM is requested), the NC carries out the following:

(1) Checks the SSM parameters to be used.

(2) Execute the NC's Safe speed monitor function, and turns ON the SSM is active (SSMSEm) signal.

(3) Turns ON the Under SSM safe speed 1 to 4 (SSMSSmn) signal when the spindle is confirmed to be at the safe speed or below.

[Related signals]

(1) SSM is active (SSMSEm)

(2) Under SSM safe speed (SSMSSmn)

Contact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
B	SOS OBSERVATION REQUEST (SPINDLE)	*SOSSRm	ZR444 bit0	ZR444 bit1	ZR444 bit2	ZR444 bit3	ZR444 bit4	ZR444 bit5	ZR444 bit6	ZR444 bit7

[Function]

This signal is used to start execution of the SOS observation function on the spindle.

This signal is available when the parameter (#51006 SOS_Enable) is set to 1 (Enable).

(If #51006 SOS_Enable is 0 (Disable), this signal is ignored.)

[Operation]

When SOS observation request is turned OFF (When SOS is requested), the NC carries out the following:

(1) Checks the SOS parameters to be used.

(2) Executes the NC's Safe operating stop function and turns ON the SOS is active (SOSSEm) signal.

(3) Turns ON In SOS stop (SOSSSm) when the safe standstill state of the spindle is confirmed.

[Related signals]

(1) SOS is active (SOSSEm)

(2) In SOS stop (SOSSSm)

Contact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
B	SAFE STOP 1 REQUEST (SPINDLE)	*SS1SRm	ZR445 bit0	ZR445 bit1	ZR445 bit2	ZR445 bit3	ZR445 bit4	ZR445 bit5	ZR445 bit6	ZR445 bit7

[Function]

This signal is used to start execution of Safe stop 1 on the spindle.

This signal is available when the parameter (#51007 SS1_Enable) is set to 1 (Enable).

(If #51007 SS1_Enable is 0 (Disable), this signal is ignored.)

[Operation]

When the Safe stop 1 request signal is turned OFF (When SS1 is requested), the NC carries out the following:

(1) Checks the SS1 parameters to be used.

(2) Executes the NC's Safe stop 1 function, and turns ON the SS1 is active (SS1SEm) signal.

(3) Turns ON the In SS1 stop (SS1SSm) signal when the spindle deceleration is confirmed.

[Related signals]

(1) SS1 is active (SS1SEm)

(2) In SS1 stop (SS1SSm)

Contact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
B	SAFE STOP 2 REQUEST (SPINDLE)	*SS2SRm	ZR446 bit0	ZR446 bit1	ZR446 bit2	ZR446 bit3	ZR446 bit4	ZR446 bit5	ZR446 bit6	ZR446 bit7

[Function]

This signal is used to start execution of Safe stop 2 on the spindle.

This signal is available when SS2 is enabled by the parameter (#51008 SS2_Enable).

(This signal is ignored when SS2 is disabled by #51008 SS2_Enabl.)

[Operation]

When Safe stop 2 request is turned OFF (When SS2 is requested), the NC carries out the following:

(1) Checks the SS2 parameters to be used.

(2) Executes Safe stop 2, and turns ON the SS2 is active (SS2SEm) signal.

(3) Executes Safe operating stop (SOS) when the spindle deceleration is confirmed.

[Related signals]

(1) SS2 is active (SS2SEm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
B	SAFE TORQUE OFF RE-QUEST(SPINDLE)	*STOSRm	ZR447 bit0	ZR447 bit1	ZR447 bit2	ZR447 bit3	ZR447 bit4	ZR447 bit5	ZR447 bit6	ZR447 bit7

[Function]

This signal is used to start execution of the Safe torque off function on the spindle.
This signal is available when STO is enabled by the parameter (#51009 STO_Enable).
(This signal is ignored when STO is disabled by #51009 STO_Enable.)

[Operation]

When the Safe torque off request signal is turned OFF (When STO is requested), the NC carries out the following:
(1) Checks the STO parameters to be used.
(2) Executes the NC's Safe torque off function, and turns ON the STO is active (STOSEm) signal.
(3) Turns ON the In Safe torque off (STOSSm) signal when the main drive power to the spindle has been shut OFF.

[Related signals]

(1) STO is active (STOSEm)
(2) In Safe torque off (STOSSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SAFE RESET(SPINDLE)	SRSTSm	ZR452 bit0	ZZR452 bit1	ZR452 bit2	ZR452 bit3	ZR452 bit4	ZR452 bit5	ZR452 bit6	ZR452 bit7

[Function]

This signal is used to reset the safety function's alarm. When the safety function's alarm is not occurring, this signal is ignored.

[Operation]

By turning ON this signal, NC carries out the following:
(1) Check whether the occurring alarm for safety function is in the state that is possible to cancel*.
* The alarm is possible to cancel in any of the following status.
- When the function corresponding to the occurring alarm (SLS/SOS/SS1/SS2) are enabled, the function enabled is determined to be in safety status. (In Safely-limited speed/ In Safe operating stop/ In Safe stop 1 are ON. (The safety status of SS2 is determined by Safe operating stop.))
- The function corresponding to the occurring alarm is (SLS/SLP/SOS/SS1/SS2) is disabled. (The request signal is OFF.)
(2) Cancel the alarm after the check proves the alarm status is possible to cancel.
(3) Turn back the drive power ON.

[Caution]

When the safety functions alarm, including the parameter error, are not in state that to be canceled, (In Safely-limited speed, In Safe operating stop, and In Safe stop 1 are OFF in enabled SLS, SOS, SS1, and SS2), the alarm will not be canceled even when this signal is turned ON. (This signal will be ignored.)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SLS SPEED CHANGE IN-PUT(SPINDLE)	SLSSMImn	ZR468	ZR469	ZR470	ZR471	ZR472	ZR473	ZR474	ZR475

[Function]

This signal specifies the SLS speed tolerance to be used for the SLS observation function.
This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).
(This signal is ignored when SLS is disabled by #51002 SLS_Enable.)

SLS speed input selection method

SLS speed change input		No. of step to be selected	Corresponding SLS speed tolerance parameter
Bit1	Bit0		
0	0	1	#51303 SLS_SSpeed1
0	1	2	#51304 SLS_SSpeed2
1	0	3	#51305 SLS_SSpeed3
1	1	4	#51306 SLS_SSpeed4

[Operation]

When this signal is changed, SLS speed change output (SLSSMOmn) is also changed.
(SLSSMOmn is changed even though SLS observation request (*SLSSRm) is ON (when SLS is not requested).)

[Related signals]

(1) SLS speed change output (SLSSMOmn)
(2) SLS speed override input (SLSSOVRImn)
(3) SLS speed override output (SLSSOVROmn)
(4) SLS observation request (*SLSSRm)
(5) SLS observation is active (SLSSEm)
(6) Under SLS limit (SLSSSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SLS SPEED OVERRIDE INPUT(SPINDLE)	SLSSOVR-lmn	ZR468	ZR469	ZR470	ZR471	ZR472	ZR473	ZR474	ZR475

[Function]

This signal specifies the SLS speed override to be used for the SLS observation function.
This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).
(This signal is ignored when SLS is disabled by #51002 SLS_Enable.)

SLS speed override selection method

SLS speed override input				No. of step to be selected	Corresponding SLS speed override parameter
Bit7	Bit6	Bit5	Bit4		
0	0	0	0	1	#51307 SLS_SOverride1
0	0	0	1	2	#51308 SLS_SOverride2
0	0	1	0	3	#51309 SLS_SOverride3
0	0	1	1	4	#51310 SLS_SOverride4
0	1	0	0	5	#51311 SLS_SOverride5
0	1	0	1	6	#51312 SLS_SOverride6
0	1	1	0	7	#51313 SLS_SOverride7
0	1	1	1	8	#51314 SLS_SOverride8
1	0	0	0	9	#51315 SLS_SOverride9
1	0	0	1	10	#51316 SLS_SOverride10
1	0	1	0	11	#51317 SLS_SOverride11
1	0	1	1	12	#51318 SLS_SOverride12
1	1	0	0	13	#51319 SLS_SOverride13
1	1	0	1	14	#51320 SLS_SOverride14
1	1	1	0	15	#51321 SLS_SOverride15
1	1	1	1	16	#51322 SLS_SOverride16

[Operation]

When this signal is changed, SLS speed override output (SLSSOVROmn) is also changed.
(SLSSOVROmn is changed even though SLS observation request (*SLSSRm) is ON (when SLS is not requested).)

[Related signals]

(1) SLS speed change input (SLSSMImn)
(2) SLS speed change output (SLSSMOmn)
(3) SLS speed override output (SLSSOVROmn)
(4) SLS observation request (*SLSSRm)
(5) SLS observation is active (SLSSEm)
(6) Under SLS limit (SLSSSm)

Con-tact	Signal name	Signal abbreviation	
A	SPECIAL SAFETY ALARM CANCEL (SYSTEM COMMON)	SARLS	ZR532 bit0

[Function]

This signal is used to turn the cancel prevention alarm into the cancel possible mode. The cancel prevention alarm occurs in the Smart safety observation diagnosis function.

[Operation]

When the cancel prevention alarm is occurring, NC can be in special safety alarm cancel mode by turning ON this signal. With this alarm ON, turn OFF -> ON -> OFF the Alarm reset signal (SRSTm/SRSTSm) for the alarm cancel target axis, the cancel prevention alarm and be canceled.

[Caution]

The cancel operation of the cancel prevention alarm should be carried out after solving the cause of the alarm occurrence (replacing the encoder/ replacing the motor etc.)

[Related signals]

(1) Safety reset (Control axis) (SRSTm)

(2) Safety reset (Spindle) (SRSTSm)

Con-tact	Signal name	Signal abbreviation	
A	OUTPUT OFF CHECK REQUEST	SIOOFFCHK	ZR1280 bit0

[Function]

This signal enables the output OFF check function. This function can also be enabled while the Output OFF check not complete signal (ZR1536 bit2) is OFF.

[Operation]

When this signal is turned ON (set to 1), the NC carries out the following:

(1) Turns OFF all the output signals of the dual signal unit.

(2) Confirms that the feedback input signals of the output signals turn OFF within a certain period of time.

(3) Returns the output statuses to the original.

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Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SLS OBSERVATION IS ACTIVE (CONTROL AXIS)	SLSEm	ZR544 bit0	ZR544 bit1	ZR544 bit2	ZR544 bit3	ZR544 bit4	ZR544 bit5	ZR544 bit6	ZR544 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR544 bit8	ZR544 bit9	ZR544 bit10	ZR544 bit11	ZR544 bit12	ZR544 bit13	ZR544 bit14	ZR544 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR545 bit0	ZR545 bit1	ZR545 bit2	ZR545 bit3	ZR545 bit4	ZR545 bit5	ZR545 bit6	ZR545 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR545 bit8	ZR545 bit9	ZR545 bit10	ZR545 bit11	ZR545 bit12	ZR545 bit13	ZR545 bit14	ZR545 bit15

[Function]

This signal indicates that SLS observation has been enabled on the control axis.

[Operation]

This signal turns ON when SLS observation request (*SLSRm) is turned OFF (when SLS is requested), and so the NC starts execution of SLS. This signal turns OFF when SLS observation request (*SLSRm) is turned ON (when SLS is not requested).

[Related signals]

(1) SLS observation request (*SLSRm)

(2) Under SLS limit (SLSSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	UNDER SLS LIMIT (CONTROL AXIS)	SLSSm	ZR546 bit0	ZR546 bit1	ZR546 bit2	ZR546 bit3	ZR546 bit4	ZR546 bit5	ZR546 bit6	ZR546 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR546 bit8	ZR546 bit9	ZR546 bit10	ZR546 bit11	ZR546 bit12	ZR546 bit13	ZR546 bit14	ZR546 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR547 bit0	ZR547 bit1	ZR547 bit2	ZR547 bit3	ZR547 bit4	ZR547 bit5	ZR547 bit6	ZR547 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR547 bit8	ZR547 bit9	ZR547 bit10	ZR547 bit11	ZR547 bit12	ZR547 bit13	ZR547 bit14	ZR547 bit15

[Function]

This signal indicates that SLS observation has been enabled on the control axis and that the axis is at the safely-limited speed or lower.

[Operation]

This signal turns ON when SLS observation request (*SLSRm) is turned OFF (when SLS is requested), the NC starts execution of SLS, and then the speed of the control axis drops to the safely-limited speed or lower. This signal remains OFF if the axis' speed is exceeding the safely-limited speed. This signal turns OFF when SLS observation request (*SLSRm) is turned ON (when SLS is not requested).

[Related signals]

(1) SLS observation request (*SLSRm)

(2) SLS observation is active (SLSEm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SLP OBSERVATION IS ACTIVE (CONTROL AXIS)	SLPEm	ZR548 bit0	ZR548 bit1	ZR548 bit2	ZR548 bit3	ZR548 bit4	ZR548 bit5	ZR548 bit6	ZR548 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR548 bit8	ZR548 bit9	ZR548 bit10	ZR548 bit11	ZR548 bit12	ZR548 bit13	ZR548 bit14	ZR548 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR549 bit0	ZR549 bit1	ZR549 bit2	ZR549 bit3	ZR549 bit4	ZR549 bit5	ZR549 bit6	ZR549 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR549 bit8	ZR549 bit9	ZR549 bit10	ZR549 bit11	ZR549 bit12	ZR549 bit13	ZR549 bit14	ZR549 bit15

[Function]

This signal indicates that SLP observation has been enabled on the control axis.

[Operation]

This signal turns ON when SLP observation request (*SLPRm) is turned OFF (when SLP is requested), and so the NC starts execution of SLP. This signal turns OFF when SLP observation request (*SLPRm) is turned ON (when SLP is not requested).

[Related signals]

(1) SLP observation request (*SLPRm)

(2) In SLP range (SLPSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	IN SLP RANGE (CONTROL AXIS)	SLPSm	ZR550 bit0	ZR550 bit1	ZR550 bit2	ZR550 bit3	ZR550 bit4	ZR550 bit5	ZR550 bit6	ZR550 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR550 bit8	ZR550 bit9	ZR550 bit10	ZR550 bit11	ZR550 bit12	ZR550 bit13	ZR550 bit14	ZR550 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR551 bit0	ZR551 bit1	ZR551 bit2	ZR551 bit3	ZR551 bit4	ZR551 bit5	ZR551 bit6	ZR551 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR551 bit8	ZR551 bit9	ZR551 bit10	ZR551 bit11	ZR551 bit12	ZR551 bit13	ZR551 bit14	ZR551 bit15

[Function]

This signal indicates that SLP observation has been enabled on the control axis and that the axis is in the SLP position tolerance range.

[Operation]

This signal turns ON when SLP observation request (*SLPRm) is turned OFF (when SLP is requested), the NC starts execution of SLP, and then the position of the control axis reaches the SLP position tolerance range. This signal remains OFF if the axis' position is outside the SLP position tolerance range. This signal turns OFF when SLP observation request (*SLPRm) is turned ON (when SLP is not requested).

[Related signals]

(1) SLP observation request (*SLPRm)

(2) SLP observation is active (SLPEm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SSM IS ACTIVE (CONTROL AXIS)	SSMEm	ZR552 bit0	ZR552 bit1	ZR552 bit2	ZR552 bit3	ZR552 bit4	ZR552 bit5	ZR552 bit6	ZR552 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR552 bit8	ZR552 bit9	ZR552 bit10	ZR552 bit11	ZR552 bit12	ZR552 bit13	ZR552 bit14	ZR552 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR553 bit0	ZR553 bit1	ZR553 bit2	ZR553 bit3	ZR553 bit4	ZR553 bit5	ZR553 bit6	ZR553 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR553 bit8	ZR553 bit9	ZR553 bit10	ZR553 bit11	ZR553 bit12	ZR553 bit13	ZR553 bit14	ZR553 bit15

[Function]

This signal indicates that Safe speed monitor has been enabled on the control axis.

[Operation]

This signal turns ON when SSM request (*SSMRm) is turned OFF (when SSM is requested) and the NC starts execution of SSM.

This signal turns OFF when SSM request (*SSMRm) is turned ON (when SSM is not requested).

[[Related signals]

(1) SSM request (*SSMRm)

(2) Under SSM safe speed (SSMSmn)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SAFE CAM IS ACTIVE (CONTROL AXIS)	SCAEm	ZR554 bit0	ZR554 bit1	ZR554 bit2	ZR554 bit3	ZR554 bit4	ZR554 bit5	ZR554 bit6	ZR554 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR554 bit8	ZR554 bit9	ZR554 bit10	ZR554 bit11	ZR554 bit12	ZR554 bit13	ZR554 bit14	ZR554 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR555 bit0	ZR555 bit1	ZR555 bit2	ZR555 bit3	ZR555 bit4	ZR555 bit5	ZR555 bit6	ZR555 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR555 bit8	ZR555 bit9	ZR555 bit10	ZR555 bit11	ZR555 bit12	ZR555 bit13	ZR555 bit14	ZR555 bit15

[Function]

This signal indicates that Safe cam has been enabled on the control axis.

[Operation]

This signal turns ON when Safe cam request (*SCARm) is turned OFF (when SCA is requested) and so the NC starts execution of SCA. This signal turns OFF when Safe cam request (*SCARm) is turned ON (when SCA is not requested).

[Related signals]

(1) Safe cam request (*SCARm)

(2) Safe cam position (SCASmn)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SOS IS ACTIVE (CONTROL AXIS)	SOSEm	ZR556 bit0	ZR556 bit1	ZR556 bit2	ZR556 bit3	ZR556 bit4	ZR556 bit5	ZR556 bit6	ZR556 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR556 bit8	ZR556 bit9	ZR556 bit10	ZR556 bit11	ZR556 bit12	ZR556 bit13	ZR556 bit14	ZR556 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR557 bit0	ZR557 bit1	ZR557 bit2	ZR557 bit3	ZR557 bit4	ZR557 bit5	ZR557 bit6	ZR557 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR557 bit8	ZR557 bit9	ZR557 bit10	ZR557 bit11	ZR557 bit12	ZR557 bit13	ZR557 bit14	ZR557 bit15

[Function]

This signal indicates that Safety operating stop has been enabled on the control axis in response to SOS observation request (*SOSRm). Note that if SOS is activated by a start request from SS2, there is no output to this signal.

[Operation]

This signal turns ON when SOS observation request (*SOSRm) is turned OFF (when SOS is requested), and so the NC starts execution of SOS. This signal turns OFF when SOS observation request (*SOSRm) is turned ON (when SOS is not requested).

[Related signals]

(1) SOS observation request (*SOSRm)

(2) In SOS stop (SOSSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	IN SOS STOP (CONTROL AXIS)	SOSSm	ZR558 bit0	ZR558 bit1	ZR558 bit2	ZR558 bit3	ZR558 bit4	ZR558 bit5	ZR558 bit6	ZR558 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR558 bit8	ZR558 bit9	ZR558 bit10	ZR558 bit11	ZR558 bit12	ZR558 bit13	ZR558 bit14	ZR558 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR559 bit0	ZR559 bit1	ZR559 bit2	ZR559 bit3	ZR559 bit4	ZR559 bit5	ZR559 bit6	ZR559 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR559 bit8	ZR559 bit9	ZR559 bit10	ZR559 bit11	ZR559 bit12	ZR559 bit13	ZR559 bit14	ZR559 bit15

[Function]

This signal indicates that the SOS is active (SOSEm) signal of the axis has been turned ON or a start request has been made by SS2, and that the control axis is at a standstill.

[Operation]

This signal turns ON when the NC has started execution of SOS due to turning-OFF of SOS observation request (*SOSRm) (SOS requested) or due to a start request from SS2, and so the control axis has been set to a standstill. This signal remains OFF while the control axis is not at a standstill. This signal turns OFF when SOS observation request (*SOSRm) is turned ON (when SOS is not requested) and when SS2 makes no request.

[Related signals]

(1) SOS observation request (*SOSRm)

(2) SOS is active (SOSEm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SS1 IS ACTIVE (CONTROL AXIS)	SS1Em	ZR560 bit0	ZR560 bit1	ZR560 bit2	ZR560 bit3	ZR560 bit4	ZR560 bit5	ZR560 bit6	ZR560 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR560 bit8	ZR560 bit9	ZR560 bit10	ZR560 bit11	ZR560 bit12	ZR560 bit13	ZR560 bit14	ZR560 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR561 bit0	ZR561 bit1	ZR561 bit2	ZR561 bit3	ZR561 bit4	ZR561 bit5	ZR561 bit6	ZR561 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR561 bit8	ZR561 bit9	ZR561 bit10	ZR561 bit11	ZR561 bit12	ZR561 bit13	ZR561 bit14	ZR561 bit15

[Function]

This signal indicates that Safe stop 1 has been enabled in response to Safe stop 1 request (*SS1Rm).

Note that if SS1 is activated due to occurrence of a smart safety observation error, there is no output to this signal.

[Operation]

This signal turns ON when Safe stop 1 request (*SS1Rm) is turned OFF (when SS1 is requested), and so the NC starts execution of SS1. This signal turns OFF when Safe stop 1 request (*SS1Rm) is turned ON (when SS1 is not requested).

[Related signals]

(1) Safe stop 1 request (*SS1Rm)

(2) In SS1 stop (SS1Sm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	IN SS1 STOP (CONTROL AXIS)	SS1Sm	ZR562 bit0	ZR562 bit1	ZR562 bit2	ZR562 bit3	ZR562 bit4	ZR562 bit5	ZR562 bit6	ZR562 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR562 bit8	ZR562 bit9	ZR562 bit10	ZR562 bit11	ZR562 bit12	ZR562 bit13	ZR562 bit14	ZR562 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR563 bit0	ZR563 bit1	ZR563 bit2	ZR563 bit3	ZR563 bit4	ZR563 bit5	ZR563 bit6	ZR563 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR563 bit8	ZR563 bit9	ZR563 bit10	ZR563 bit11	ZR563 bit12	ZR563 bit13	ZR563 bit14	ZR563 bit15

[Function]

This signal indicates that SS1 has been executed due to turning-ON of the SS1 is active (SS1Em) signal, or due to occurrence of a smart safety observation error, and that the control axis is at a standstill.

[Operation]

When Safe stop 1 request (*SS1Rm) is turned OFF (When SS1 is requested) or when a smart safety observation error occurs, SS1 starts to be executed. When the control axis decelerates to a stop, this signal is turned ON. This signal remains OFF while the axis concerned is not at a standstill. This signal turns OFF when Safe stop 1 request (*SS1Rm) is turned ON (when SS1 is not requested) and when SS1 is not executed due to occurrence of a smart safety observation error.

[Related signals]

(1) Safe stop 1 request (*SS1Rm)

(2) SS1 is active (SS1Em)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SS2 IS ACTIVE (CONTROL AXIS)	SS2Em	ZR564 bit0	ZR564 bit1	ZR564 bit2	ZR564 bit3	ZR564 bit4	ZR564 bit5	ZR564 bit6	ZR564 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR564 bit8	ZR564 bit9	ZR564 bit10	ZR564 bit11	ZR564 bit12	ZR564 bit13	ZR564 bit14	ZR564 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR565 bit0	ZR565 bit1	ZR565 bit2	ZR565 bit3	ZR565 bit4	ZR565 bit5	ZR565 bit6	ZR565 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR565 bit8	ZR565 bit9	ZR565 bit10	ZR565 bit11	ZR565 bit12	ZR565 bit13	ZR565 bit14	ZR565 bit15

[Function]

This signal indicates that Safe stop 2 has been enabled on the axis.

[Operation]

This signal turns ON when Safe stop 2 request (*SS2Rm) is turned OFF (When SS2 is requested), and so the NC starts execution of SS2. This signal turns OFF when Safe stop 2 request (*SS2Rm) is turned ON (when SS2 is not requested).

[Related signals]

(1) Safe stop 2 request (*SS2Rm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	STO IS ACTIVE (CONTROL AXIS)	STOEm	ZR566 bit0	ZR566 bit1	ZR566 bit2	ZR566 bit3	ZR566 bit4	ZR566 bit5	ZR566 bit6	ZR566 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR566 bit8	ZR566 bit9	ZR566 bit10	ZR566 bit11	ZR566 bit12	ZR566 bit13	ZR566 bit14	ZR566 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR567 bit0	ZR567 bit1	ZR567 bit2	ZR567 bit3	ZR567 bit4	ZR567 bit5	ZR567 bit6	ZR567 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR567 bit8	ZR567 bit9	ZR567 bit10	ZR567 bit11	ZR567 bit12	ZR567 bit13	ZR567 bit14	ZR567 bit15

[Function]

This signal indicates that the Safe torque off function has been enabled on the control axis in response to Safe torque off request (*STORm). Note that if STO is activated due to occurrence of a smart safety observation error, there is no output to this signal.

[Operation]

This signal turns ON when Safe torque off request (*STORm) is turned OFF (when STO is requested), and so the NC starts execution of STO. This signal turns OFF when Safe torque off request (*STORm) is turned ON (when STO is not requested).

[Related signals]

(1) Safe torque off request (*STORm)

(2) In Safe torque off (STOSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	IN SAFE TORQUE OFF (CONTROL AXIS)	STOSm	ZR568 bit0	ZR568 bit1	ZR568 bit2	ZR568 bit3	ZR568 bit4	ZR568 bit5	ZR568 bit6	ZR568 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR568 bit8	ZR568 bit9	ZR568 bit10	ZR568 bit11	ZR568 bit12	ZR568 bit13	ZR568 bit14	ZR568 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR569 bit0	ZR569 bit1	ZR569 bit2	ZR569 bit3	ZR569 bit4	ZR569 bit5	ZR569 bit6	ZR569 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR569 bit8	ZR569 bit9	ZR569 bit10	ZR569 bit11	ZR569 bit12	ZR569 bit13	ZR569 bit14	ZR569 bit15

[Function]

This signal indicates that STO has been executed due to turning-ON of the STO is active (STOEm) signal or due to occurrence of a smart safety observation error, and that the shutoff of the drive main power is completed.

[Operation]

This signal turns ON when the NC has started execution of STO due to turning-OFF of Safe torque off request (*STORm) (STO request) or due to occurrence of a smart safety observation error, and so the main drive power for the axis has been shut off. This signal remains OFF while the main drive power for the axis has not been shut off. This signal turns OFF when Safe torque off request (*STORm) is turned ON (when STO is not requested) and when STO is not executed due to occurrence of a smart safety observation error.

[Related signals]

(1) Safe torque off request (STORm)

(2) STO is active (STOEm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	IN SBC MOTOR BRAKE ENABLED (CONTROL AXIS)	SBCEm	ZR570 bit0	ZR570 bit1	ZR570 bit2	ZR570 bit3	ZR570 bit4	ZR570 bit5	ZR570 bit6	ZR570 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR570 bit8	ZR570 bit9	ZR570 bit10	ZR570 bit11	ZR570 bit12	ZR570 bit13	ZR570 bit14	ZR570 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR571 bit0	ZR571 bit1	ZR571 bit2	ZR571 bit3	ZR571 bit4	ZR571 bit5	ZR571 bit6	ZR571 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR571 bit8	ZR571 bit9	ZR571 bit10	ZR571 bit11	ZR571 bit12	ZR571 bit13	ZR571 bit14	ZR571 bit15

[Function]

This signal shows that the SBC Motor brake starting request of the axis corresponding to the signal is enabled.

[Operation]

This signal turns ON when the SBC Motor brake starting request signal (*SBCRm) is OFF (requesting). Additionally, this signal turns OFF when the SBC Motor brake starting request signal is ON (not requesting). While this signal is ON, NC outputs the motor brake start command to the drive unit.

[Related signals]

(1) SBC Motor brake starting request (*SBCRm)

(2) In SBC Motor brake start signal (SBCSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	IN SBC MOTOR BRAKE START SIGNAL (CONTROL AXIS)	SBCSm	ZR572 bit0	ZR572 bit1	ZR572 bit2	ZR572 bit3	ZR572 bit4	ZR572 bit5	ZR572 bit6	ZR572 bit7
			9th axis	10th axis	11th axis	12th axis	13th axis	14th axis	15th axis	16th axis
			ZR572 bit8	ZR572 bit9	ZR572 bit10	ZR572 bit11	ZR572 bit12	ZR572 bit13	ZR572 bit14	ZR572 bit15
			17th axis	18th axis	19th axis	20th axis	21st axis	22nd axis	23rd axis	24th axis
			ZR573 bit0	ZR573 bit1	ZR573 bit2	ZR573 bit3	ZR573 bit4	ZR573 bit5	ZR573 bit6	ZR573 bit7
			25th axis	26th axis	27th axis	28th axis	29th axis	30th axis	31st axis	32nd axis
			ZR573 bit8	ZR573 bit9	ZR573 bit10	ZR573 bit11	ZR573 bit12	ZR573 bit13	ZR573 bit14	ZR573 bit15

[Function]

This signal shows that the Motor brake of the axis corresponding to the signal is in start.

[Operation]

The motor brake is started at the time of the SBC Motor brake starting request (*SBCRm) turning OFF (requesting), or at the time of the power shut OFF (at Safety related error, at *STORm signal OFF, at *SS1Rm signal OFF). After the motor brake start is complete, this signal turns ON.

[Caution]

This signal does not turn ON in the case of the axis which is using the motor without embedded brake.

[Related signals]

(1) SBC Motor brake starting request (*SBCRm)
(2) Safe torque off request (*STORm)
(3) Safe stop 1 request (*SS1Rm)
(4) In SBC Motor brake enabled (SBCEm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	EXTERNAL BRAKE SBT INCOMPLETE (CONTROL AXIS)	SBTNFEXm	ZR574 bit0	ZR574 bit1	ZR574 bit2	ZR574 bit3	ZR574 bit4	ZR574 bit5	ZR574 bit6	ZR574 bit7
			9th axis	10th axis	11th axis	12th axis	13th axis	14th axis	15th axis	16th axis
			ZR574 bit8	ZR574 bit9	ZR574 bit10	ZR574 bit11	ZR574 bit12	ZR574 bit13	ZR574 bit14	ZR574 bit15
			17th axis	18th axis	19th axis	20th axis	21st axis	22nd axis	23rd axis	24th axis
			ZR575 bit0	ZR575 bit1	ZR575 bit2	ZR575 bit3	ZR575 bit4	ZR575 bit5	ZR575 bit6	ZR575 bit7
			25th axis	26th axis	27th axis	28th axis	29th axis	30th axis	31st axis	32nd axis
			ZR575 bit8	ZR575 bit9	ZR575 bit10	ZR575 bit11	ZR575 bit12	ZR575 bit13	ZR575 bit14	ZR575 bit15

[Function]

This signal shows that the certain period of time has passed since the last safe brake test of the External brake was executed.

Execute the brake test as soon as possible when this signal turns ON.

[Operation]

When turning ON the NC, and after the elapse of a certain period of time since the last brake test (parameter #51011 SBT_INT), this signal turns ON. To turn OFF this signal, turn ON the External brake SBT start signal (SBTSTEXm) and execute the brake test. The test needs to be completed successfully.

Refer to the signal description of SBTSTEXm for the operation sequence of this signal.

[Related signals]

(1) External brake SBT start (SBTSTEXm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	IN SBT EXTERNAL BRAKE TEST (CONTROL AXIS)	SBTEXBRm	ZR576 bit0	ZR576 bit1	ZR576 bit2	ZR576 bit3	ZR576 bit4	ZR576 bit5	ZR576 bit6	ZR576 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR576 bit8	ZR576 bit9	ZR576 bit10	ZR576 bit11	ZR576 bit12	ZR576 bit13	ZR576 bit14	ZR576 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR577 bit0	ZR577 bit1	ZR577 bit2	ZR577 bit3	ZR577 bit4	ZR577 bit5	ZR577 bit6	ZR577 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR577 bit8	ZR577 bit9	ZR577 bit10	ZR577 bit11	ZR577 bit12	ZR577 bit13	ZR577 bit14	ZR577 bit15

[Function]

This signal shows that the axis corresponding to the signal is in the External brake test.

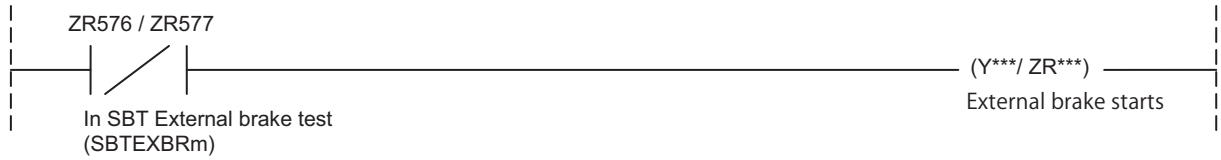
[Operation]

After the External brake SBT start signal (SBTSTEXm) turns ON, this signal's ON/OFF switches.

Incorporate the signal processing logic at the user side to actually start the external brake at the time of this signal ON.

Test pattern of the External brake starting method

	SBTEXBRm 1CH	SBTEXBRm 2CH	External brake starting signal 1CH	External brake starting signal 2CH
Test pattern1	ON	ON	OFF	OFF



Example of the signal processing logic for External brake test

[Related signals]

(1) External brake SBT start (SBTSTEXm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	MOTOR BRAKE SBT IN-COMPLETE (CONTROL AXIS)	SBTNFMOm	ZR578 bit0	ZR578 bit1	ZR578 bit2	ZR578 bit3	ZR578 bit4	ZR578 bit5	ZR578 bit6	ZR578 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR578 bit8	ZR578 bit9	ZR578 bit10	ZR578 bit11	ZR578 bit12	ZR578 bit13	ZR578 bit14	ZR578 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR579 bit0	ZR579 bit1	ZR579 bit2	ZR579 bit3	ZR579 bit4	ZR579 bit5	ZR579 bit6	ZR579 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR579 bit8	ZR579 bit9	ZR579 bit10	ZR579 bit11	ZR579 bit12	ZR579 bit13	ZR579 bit14	ZR579 bit15

[Function]

This signal shows that the certain period of time has passed since the last safe brake test of the Motor brake was executed.

Execute the brake test as soon as possible when this signal turns ON.

[Operation]

When turning ON the NC, and after the elapse of a certain period of time since the last brake test (parameter #51011 SBT_INT), this signal turns ON. To turn OFF this signal, turn ON the Motor brake SBT start signal (SBTSTMOm) and execute the brake test. The test needs to be completed successfully.

Refer to the signal description of SBTSTMOm for the operation sequence of this signal.

[Related signals]

(1) Motor brake SBT start (SBTSTMOm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	IN SAFETY ABSOLUTE POSITION ESTABLISH-ING (CONTROL AXIS)	SFAB-SPESTm	ZR580 bit0	ZR580 bit1	ZR580 bit2	ZR580 bit3	ZR580 bit4	ZR580 bit5	ZR580 bit6	ZR580 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR580 bit8	ZR580 bit9	ZR580 bit10	ZR580 bit11	ZR580 bit12	ZR580 bit13	ZR580 bit14	ZR580 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR581 bit0	ZR581 bit1	ZR581 bit2	ZR581 bit3	ZR581 bit4	ZR581 bit5	ZR581 bit6	ZR581 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR581 bit8	ZR581 bit9	ZR581 bit10	ZR581 bit11	ZR581 bit12	ZR581 bit13	ZR581 bit14	ZR581 bit15

[Function]

This signal shows that the Safety absolute position is established for executing SLP/SCA.

[Operation]

When the warning “Safe absol. posn unestablished” occurs, this signal turns ON after the Safety absolute position check signal is turned ON and the warning is canceled (it will be in the state of the Safety absolute position established.). Additionally, when the warning “Safe absol. posn unestablished” occurs, this signal turns OFF.

Once this signal is ON, the ON status is held until the warning “Safe absol. posn unestablished” occurs even when the power is turned OFF and ON again. While this signal is ON, the observation by SLP and the signal output by SCA can be carried out. (When this signal is OFF, SLP/SCA does not operate.)

[Related signal]

(1) Safety absolute position check (control axis) (SFABSPFXm)

Contact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SMART SAFETY OBSERVATION ERROR OCCURING SERVO AXIS (CONTROL AXIS)	SFERR_SVm	ZR582 bit0	ZR582 bit1	ZR582 bit2	ZR582 bit3	ZR582 bit4	ZR582 bit5	ZR582 bit6	ZR582 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR582 bit8	ZR582 bit9	ZR582 bit10	ZR582 bit11	ZR582 bit12	ZR582 bit13	ZR582 bit14	ZR582 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR583 bit0	ZR583 bit1	ZR583 bit2	ZR583 bit3	ZR583 bit4	ZR583 bit5	ZR583 bit6	ZR583 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR583 bit8	ZR583 bit9	ZR583 bit10	ZR583 bit11	ZR583 bit12	ZR583 bit13	ZR583 bit14	ZR583 bit15

[Function]

This signal shows the servo axis which the Smart safety observation error occurred.

[Operation]

When the Smart safety observation error for each axis is occurring, it turns ON the BIT corresponding to the servo axis that the error occurred.

It outputs 0 when Smart safety observation error for each axis is not in occurrence state.

[Caution]

It outputs 0 when Smart safety observation error which does not display the message of the axis name is in occurrence state.

[Related signals]

(1) V number of smart safety observation error (SFERR_VNO)

(2) E number of smart safety observation error (SFERR_ENO)

(3) Smart safety observation error occurring spindle (SFERR_SPm)

Contact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SMART SAFETY OBSERVATION WARNING OCCURING SERVO AXIS (CONTROL AXIS)	SFWRG_SVm	ZR584 bit0	ZR584 bit1	ZR584 bit2	ZR584 bit3	ZR584 bit4	ZR584 bit5	ZR584 bit6	ZR584 bit7
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR584 bit8	ZR584 bit9	ZR584 bit10	ZR584 bit11	ZR584 bit12	ZR584 bit13	ZR584 bit14	ZR584 bit15
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR585 bit0	ZR585 bit1	ZR585 bit2	ZR585 bit3	ZR585 bit4	ZR585 bit5	ZR585 bit6	ZR585 bit7
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR585 bit8	ZR585 bit9	ZR585 bit10	ZR585 bit11	ZR585 bit12	ZR585 bit13	ZR585 bit14	ZR585 bit15

[Function]

This signal shows the Servo axis which the Smart safety observation warning occurred.

[Operation]

When the Smart safety observation warning for each axis is occurring, it turns ON the BIT corresponding to the servo axis that the warning occurred.

It outputs 0 when Smart safety observation warning is not in occurrence state.

[Caution]

It outputs 0 when Smart safety observation warning which does not display the message of the axis name occurs.

[Related signals]

(1) V number of smart safety observation warning (SFWRG_VNO)

(2) W number of smart safety observation warning (SFWRG_WNO)

(3) Smart safety observation warning occurring spindle (SFWRG_SPm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SLS SPEED CHANGE OUTPUT (CONTROL AXIS)	SLSMOmn	ZR608	ZR609	ZR610	ZR611	ZR612	ZR613	ZR614	ZR615
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR616	ZR617	ZR618	ZR619	ZR620	ZR621	ZR622	ZR623
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR624	ZR625	ZR626	ZR627	ZR628	ZR629	ZR630	ZR631
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR632	ZR633	ZR634	ZR635	ZR636	ZR637	ZR638	ZR639

[Function]

This signal outputs the currently selected SLS speed tolerance's step No.

This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).

(When SLS is disabled by #51002 SLS_Enable, always zero is output to all the bits of this signal (SLS speed tolerance 1).)

SLS speed change output status

SLS speed change output		No. of step to be selected	Corresponding SLS speed parameter
Bit1	Bit0		
0	0	1	#51103 SLS_Speed1
0	1	2	#51104 SLS_Speed2
1	0	3	#51105 SLS_Speed3
1	1	4	#51106 SLS_Speed4

[Operation]

When SLS speed change input (SLSMImn) is changed, this signal is also changed.

(This signal is changed even though SLS observation request (*SLSRm) is ON (when SLS is not requested).)

[Related signals]

(1) SLS speed change input (SLSMImn)
(2) SLS speed override input (SLSOVRImn)
(3) SLS speed override output (SLSOVROmn)
(4) SLS observation request (*SLSRm)
(5) SLS observation is active (SLSEm)
(6) Under SLS limit (SLSSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SLS SPEED OVERRIDE OUTPUT (CONTROL AXIS)	SLSOV-ROmn	ZR608	ZR609	ZR610	ZR611	ZR612	ZR613	ZR614	ZR615
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR616	ZR617	ZR618	ZR619	ZR620	ZR621	ZR622	ZR623
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR624	ZR625	ZR626	ZR627	ZR628	ZR629	ZR630	ZR631
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR632	ZR633	ZR634	ZR635	ZR636	ZR637	ZR638	ZR639

[Function]

This signal outputs the currently selected SLS speed override.

This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).

(When SLS is disabled by #51002 SLS_Enable, always zero is output to all the bits of this signal (SLS speed override 1).)

SLS speed override output status

SLS speed override input				No. of step to be selected	Corresponding SLS speed override parameter
Bit7	Bit6	Bit5	Bit4		
0	0	0	0	1	#51107 SLS_Override1
0	0	0	1	2	#51108 SLS_Override2
0	0	1	0	3	#51109 SLS_Override3
0	0	1	1	4	#51110 SLS_Override4
0	1	0	0	5	#51111 SLS_Override5
0	1	0	1	6	#51112 SLS_Override6
0	1	1	0	7	#51113 SLS_Override7
0	1	1	1	8	#51114 SLS_Override8
1	0	0	0	9	#51115 SLS_Override9
1	0	0	1	10	#51116 SLS_Override10
1	0	1	0	11	#51117 SLS_Override11
1	0	1	1	12	#51118 SLS_Override12
1	1	0	0	13	#51119 SLS_Override13
1	1	0	1	14	#51120 SLS_Override14
1	1	1	0	15	#51121 SLS_Override15
1	1	1	1	16	#51122 SLS_Override16

[Operation]

When SLS speed override input (SLSOVRImn) is changed, this signal is also changed.

(This signal is changed even though SLS observation request (*SLSRm) is ON (when SLS is not requested).)

[Related signals]

(1) SLS speed change input (SLSMImn)

(2) SLS speed change output (SLSMOmn)

(3) SLS speed override input (SLSOVRImn)

(4) SLS observation request (*SLSRm)

(5) SLS observation is active (SLSEm)

(6) Under SLS limit (SLSSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SLP POSITION CHANGE OUTPUT (CONTROL AXIS)	SLPMOmn	ZR640	ZR641	ZR642	ZR643	ZR644	ZR645	ZR646	ZR647
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR648	ZR649	ZR650	ZR651	ZR652	ZR653	ZR654	ZR655
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR656	ZR657	ZR658	ZR659	ZR660	ZR661	ZR662	ZR663
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR664	ZR665	ZR666	ZR667	ZR668	ZR669	ZR670	ZR671

[Function]

This signal outputs the step No. of the currently selected SLP position tolerance.

This signal is available when SLP is enabled by the parameter (#51003 SLP_Enable).

(When SLP is disabled by #51003 SLP_Enable, always zero is output to all the bits of this signal (SLP position tolerance 1).)

SLP position change output status

SLP position change output		No. of step to be selected	Corresponding SLP position parameter
Bit1	Bit0		
0	0	1	#51126/51127 SLP_Position(P/M)1
0	1	2	#51128/51129 SLP_Position(P/M)2
1	0	3	#51130/51131 SLP_Position(P/M)3
1	1	4	#51132/51133 SLP_Position(P/M)4

[Operation]

When SLP position change input (SLPMImn) is changed, this signal is also changed.

(This signal is changed even though SLP observation request (*SLPRm) is ON (when SLP is not requested).)

[Related signals]

(1) SLP position change input (SLPMImn)

(2) SLP observation request (*SLPRm)

(3) SLP observation is active (SLPEm)

(4) In SLP range (SLPSm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	UNDER SSM SAFE SPEED (CONTROL AXIS)	SSMSmn	ZR672	ZR673	ZR674	ZR675	ZR676	ZR677	ZR678	ZR679
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR680	ZR681	ZR682	ZR683	ZR684	ZR685	ZR686	ZR687
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR688	ZR689	ZR690	ZR691	ZR692	ZR693	ZR694	ZR695
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR696	ZR697	ZR698	ZR699	ZR700	ZR701	ZR702	ZR703

[Function]

This signal indicates that Safe speed monitor has been enabled on the control axis, and that the axis speed is under the safe speed.

Correspondence between Under SSM safe speed signals and parameters

Under SSM safe speed		Corresponding SSM speed parameter
bit0	Under SSM safe speed 1	#51135 SSM_Speed1, #51139 SSM_Hysteresis1
bit1	Under SSM safe speed 2	#51136 SSM_Speed2, #51140 SSM_Hysteresis2
bit2	Under SSM safe speed 3	#51137 SSM_Speed3, #51141 SSM_Hysteresis3
bit3	Under SSM safe speed 4	#51138 SSM_Speed4, #51142 SSM_Hysteresis4

[Operation]

This signal turns ON when SSM request (*SSMRm) is turned OFF (When SSM is requested), the NC starts execution of SSM, and then the speed of the control axis drops to the safe speed or lower. This signal remains OFF while the control axis speed is exceeding the safe speed. This signal turns OFF when SSM request (*SSMRm) is turned ON (when SSM is not requested).

[Related signals]

(1) SSM request (*SSMRm)
(2) SSM is active (SSMEm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SAFE CAM POSITION (CONTROL AXIS)	SCASmn	ZR704 ZR705	ZR706 ZR707	ZR708 ZR709	ZR710 ZR711	ZR712 ZR713	ZR714 ZR715	ZR716 ZR717	ZR718 ZR719
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR720 ZR721	ZR722 ZR723	ZR724 ZR725	ZR726 ZR727	ZR728 ZR729	ZR730 ZR731	ZR732 ZR733	ZR734 ZR735
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR736 ZR737	ZR738 ZR739	ZR740 ZR741	ZR742 ZR743	ZR744 ZR745	ZR746 ZR747	ZR748 ZR749	ZR750 ZR751
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR752 ZR753	ZR754 ZR755	ZR756 ZR757	ZR758 ZR759	ZR760 ZR761	ZR762 ZR763	ZR764 ZR765	ZR766 ZR767

[Function]

This signal indicates the safe cam position status of the control axis.

Correspondence between Safe cam position signals and parameters (for the 1st axis)

Safe cam position		Corresponding SCA position parameter
ZR704 bit0	Safe cam position 1(-)	#51144 SCA_PositionM1
ZR704 bit1	Safe cam position 2(-)	#51146 SCA_PositionM2
:	:	:
ZR704 bit14	Safe cam position 15(-)	#51172 SCA_PositionM15
ZR704 bit15	Safe cam position 16(-)	#51174 SCA_PositionM16
ZR705 bit0	Safe cam position 1(+)	#51143 SCA_PositionP1
ZR705 bit1	Safe cam position 2(+)	#51145 SCA_PositionP2
:	:	:
ZR705 bit14	Safe cam position 15(+)	#51171 SCA_PositionP15
ZR705 bit15	Safe cam position 16(+)	#51173 SCA_PositionP16

[Operation]

When the NC has started execution of SCA in response to turning-OFF of Safe cam request (*SCARm) (SCA request), and the control axis has reached the safe position (+/-) * or further, the corresponding bit of this signal turns ON.

* Safe position (+/-) is determined based on the axis position status, which means based on SCA position (#51143 SCA_PositionM1 to #51174 SCA_PositionP16) and SCA hysteresis width (#51175 SCA_Hysteresis).

(a) When Safe cam position n (+/-) is ON

Safe position n (+/-) = SCA position n (+/-) - SCA hysteresis width (n = 1 to 16)

(b) When Safe cam position n (+/-) is OFF

Safe position n (+/-) = SCA position (+/-) n (n = 1 to 16)

Listed below is the correspondence between the statuses of Safe cam position n (-) and Safe cam position n (+) and the axis position status. (When SCA position n (+) > SCA position n (-))

Safe cam position n (-)	Safe cam position n (+)	Axis position status
0	0	Smaller than Safe position n (-)
1	0	Between Safe position n (-) and Safe position n (+)
0	1	-
1	1	In Safe position n (+) or greater

When Safe cam request (*SCARm) is turned ON (When SCA is not requested), this signal is all turned OFF.

[Related signals]

(1) Safe cam request (*SCARm)

(2) Safe cam is active (SCAEm)

Con-tact	Signal name	Signal abbreviation	1st axis	2nd axis	3rd axis	4th axis	5th axis	6th axis	7th axis	8th axis
A	SBT START POSITION (CONTROL AXIS)	SBTPOSm	ZR768 ZR769	ZR772 ZR773	ZR776 ZR777	ZR780 ZR781	ZR784 ZR785	ZR788 ZR789	ZR792 ZR793	ZR796 ZR797
			9th axis	**10th axis**	**11th axis**	**12th axis**	**13th axis**	**14th axis**	**15th axis**	**16th axis**
			ZR800 ZR801	ZR804 ZR805	ZR808 ZR809	ZR812 ZR813	ZR816 ZR817	ZR820 ZR821	ZR824 ZR825	ZR828 ZR829
			17th axis	**18th axis**	**19th axis**	**20th axis**	**21st axis**	**22nd axis**	**23rd axis**	**24th axis**
			ZR832 ZR833	ZR836 ZR837	ZR840 ZR841	ZR844 ZR845	ZR848 ZR849	ZR852 ZR853	ZR856 ZR857	ZR860 ZR861
			25th axis	**26th axis**	**27th axis**	**28th axis**	**29th axis**	**30th axis**	**31st axis**	**32nd axis**
			ZR864 ZR865	ZR868 ZR869	ZR872 ZR873	ZR876 ZR877	ZR880 ZR881	ZR884 ZR885	ZR888 ZR889	ZR892 ZR893

[Function]

This signal is used to indicate the position of the safe brake test start of the external brake test or the motor brake test.

[Operation]

This signal saves the current position on the machine coordinate at the start of the safe brake test.

This data is updated at the execution of the safe brake test. (The same value continues to be output unless the safe brake test is executed.)

The output unit is submicron.

Ex.) The case where the machine position of the 1st axis is 123456.7[μm](123.4567[mm])

Machine position 123456.7[μm] → ZR768 : D687

ZR769 : 0012

[Related signals]

(1) External brake SBT start (SBTSTEXm)

(2) Motor brake SBT start (SBTSTMOm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SLS OBSERVATION IS ACTIVE (SPINDLE)	SLSSEm	ZR1024 bit0	ZR1024 bit1	ZR1024 bit2	ZR1024 bit3	ZR1024 bit4	ZR1024 bit5	ZR1024 bit6	ZR1024 bit7

[Function]

This signal indicates that SLS observation has been enabled on the spindle.

[Operation]

This signal turns ON when SLS observation request (*SLSSRm) is turned OFF (when SLS is requested), and so the NC starts execution of the SLS observation function. This signal turns OFF when SLS observation request (*SLSSRm) is turned ON (when SLS is not requested).

[Related signals]

(1) SLS observation request (*SLSSRm)

(2) Under SLS limit (SLSSSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	UNDER SLS LIMIT (SPIN-DLE)	SLSSSm	ZR1025 bit0	ZR1025 bit1	ZR1025 bit2	ZR1025 bit3	ZR1025 bit4	ZR1025 bit5	ZR1025 bit6	ZR1025 bit7

[Function]

This signal indicates that SLS observation has been enabled on the spindle and that the spindle is at the safely-limited speed or lower.

[Operation]

This signal turns ON when SLS observation request (*SLSSRm) is turned OFF (when SLS is requested), the NC starts execution of the SLS observation function, and then the speed of the spindle drops to the safely-limited speed or lower. This signal remains OFF if the spindle's speed is exceeding the safely-limited speed.

This signal turns OFF when SLS observation request (*SLSSRm) is turned ON (when SLS is not requested).

[Related signals]

(1) SLS observation request (*SLSSRm)

(2) SLS observation is active (SLSSEm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SSM IS ACTIVE (SPINDLE)	SSMSEm	ZR1028 bit0	ZR1028 bit1	ZR1028 bit2	ZR1028 bit3	ZR1028 bit4	ZR1028 bit5	ZR1028 bit6	ZR1028 bit7

[Function]

This signal indicates that Safe speed monitor has been enabled on the spindle.

[Operation]

This signal turns ON when SSM request (*SSMSRm) is turned OFF (when SSM is requested), and so the NC starts execution of SSM. This signal turns OFF when SSM request (*SSMSRm) is turned ON (when SSM is not requested).

[Related signals]

(1) SSM request (*SSMSRm)

(2) Under SSM safe speed (SSMSSmn)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SOS IS ACTIVE (SPINDLE)	SOSSEm	ZR1030 bit0	ZR1030 bit1	ZR1030 bit2	ZR1030 bit3	ZR1030 bit4	ZR1030 bit5	ZR1030 bit6	ZR1030 bit7

[Function]

This signal indicates that Safe operating stop has been enabled on the spindle in response to SOS observation request (*SOSSRm). Note that if SOS is activated by a start request from SS2, there is no output to this signal.

[Operation]

This signal turns ON when SOS observation request (*SOSSRm) is turned OFF (when SOS is requested), and so the NC starts execution of SOS. This signal turns OFF when SOS observation request (*SOSSRm) is turned ON (when SOS is not requested).

[Related signals]

(1) SOS observation request (*SOSSRm)

(2) In SOS stop (SOSSSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	IN SOS STOP (SPINDLE)	SOSSSm	ZR1031 bit0	ZR1031 bit1	ZR1031 bit2	ZR1031 bit3	ZR1031 bit4	ZR1031 bit5	ZR1031 bit6	ZR1031 bit7

[Function]

This signal indicates that the SOS is active (SOSSEm) signal of the spindle has been turned ON or a start request has been made by SS2, and that the spindle is at a standstill.

[Operation]

This signal turns ON when the NC has started execution of SOS due to turning-OFF of SOS observation request (*SOSSRm) (SOS request) or due to a start request from SS2, and so the spindle has been set to a standstill. This signal remains OFF while the spindle is not at a standstill. This signal turns OFF when SOS observation request (*SOSSRm) is turned ON (when SOS is not requested) and when SS2 makes no request.

[Related signals]

(1) SOS observation request (*SOSSRm)

(2) SOS is active (SOSSEm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SS1 IS ACTIVE (SPINDLE)	SS1SEm	ZR1032 bit0	ZR1032 bit1	ZR1032 bit2	ZR1032 bit3	ZR1032 bit4	ZR1032 bit5	ZR1032 bit6	ZR1032 bit7

[Function]

This signal indicates that SS1 has been enabled in response to Safe stop 1 request (*SS1SRm).

Note that if SS1 has been activated by occurrence of a smart safety observation error, there is no output to this signal.

[Operation]

This signal turns ON when Safe stop 1 request (*SS1SRm) is turned OFF (when SS1 is requested) and so the NC starts execution of the Safe stop 1 function. This signal turns OFF when Safe stop 1 request (*SS1SRm) is turned ON (when SS1 is not requested).

[Related signals]

(1) Safe stop 1 request (*SS1SRm)

(2) In SS1 stop (SS1SSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	IN SS1 STOP (SPINDLE)	SS1SSm	ZR1033 bit0	ZR1033 bit1	ZR1033 bit2	ZR1033 bit3	ZR1033 bit4	ZR1033 bit5	ZR1033 bit6	ZR1033 bit7

[Function]

This signal indicates that SS1 has been executed due to turning-ON of the SS1 is active (SS1SEm) signal or due to occurrence of a smart safety observation error, and that the spindle is at a standstill.

[Operation]

When Safe stop 1 request (*SS1SRm) is turned OFF (When SS1 is requested) or when a smart safety observation error occurs, SS1 starts to be executed. When the spindle decelerates to a stop, this signal is turned ON. This signal remains OFF while the spindle concerned is not at a standstill. This signal turns OFF when Safe stop 1 request (*SS1SRm) is turned ON (when SS1 is not requested) and when SS1 is not executed due to occurrence of an smart safety observation error.

[Related signals]

(1) Safe stop 1 request (*SS1SRm)

(2) SS1 is active (SS1SEm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SS2 IS ACTIVE (SPINDLE)	SS2SEm	ZR1034 bit0	ZR1034 bit1	ZR1034 bit2	ZR1034 bit3	ZR1034 bit4	ZR1034 bit5	ZR1034 bit6	ZR1034 bit7

[Function]

This signal indicates that Safe stop 2 has been enabled on the spindle.

[Operation]

This signal turns ON when Safe stop 2 request (*SS2SRm) is turned OFF (when SS2 is requested), and so the NC starts execution of SS2. This signal turns OFF when Safe stop 2 request (*SS2SRm) is turned ON (when SS2 is not requested).

[Related signals]

(1) Safe stop 2 request (*SS2SRm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	STO IS ACTIVE (SPINDLE)	STOSEm	ZR1035 bit0	ZR1035 bit1	ZR1035 bit2	ZR1035 bit3	ZR1035 bit4	ZR1035 bit5	ZR1035 bit6	ZR1035 bit7

[Function]

This signal indicates that the Safe torque off function has been enabled on the spindle in response to Safe torque off request (*STOSRm). Note that if STO is activated due to occurrence of a smart safety observation error, there is no output to this signal.

[Operation]

This signal turns ON when Safe torque off request (*STOSRm) is turned OFF (when STO is requested) and so the NC starts execution of STO. This signal turns OFF when Safe torque off request (*STOSRm) is turned ON (when STO is not requested).

[Related signals]

(1) Safe torque off request (*STOSRm)

(2) In Safe torque off (STOSSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	IN SAFE TORQUE OFF (SPINDLE)	STOSSm	ZR1036 bit0	ZR1036 bit1	ZR1036 bit2	ZR1036 bit3	ZR1036 bit4	ZR1036 bit5	ZR1036 bit6	ZR1036 bit7

[Function]

This signal indicates that STO has been executed due to turning-ON of the STO is active (STOSEm) signal or due to occurrence of a smart safety observation error, and that the shutoff of the drive main power is completed.

[Operation]

This signal turns ON when the NC has started execution of STO due to turning-OFF of Safe torque off request (*STOSRm) (STO request) or due to occurrence of a smart safety observation error, and so the main drive power for the spindle has been shut off. This signal remains OFF while the main drive power for the spindle has not been shut off. This signal turns OFF when Safe torque off request (*STOSRm) is turned ON (when STO is not requested) and when STO is not executed due to occurrence of a smart safety observation error.

[Related signals]

(1) Safe torque off request (*STOSRm)

(2) STO is active (STOSEm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SMART SAFETY OBSER-VATION ERROR OCCUR-ING SPINDLE (SPINDLE)	SFERR_SPm	ZR1043 bit0	ZR1043 bit1	ZR1043 bit2	ZR1043 bit3	ZR1043 bit4	ZR1043 bit5	ZR1043 bit6	ZR1043 bit7

[Function]

This signal shows the Spindle which the Smart safety observation error occurred.

[Operation]

When the Smart safety observation error for each axis is occurring, it turns ON the BIT corresponding to the Spindle that the error occurred. It outputs 0 when Smart safety observation error for each axis is not in occurrence state.

[Caution]

It outputs 0 when Smart safety observation error which does not display the message of the axis name is in occurrence state.

[Related signals]

(1) V number of smart safety observation error (SFERR_VNO)

(2) E number of smart safety observation error (SFERR_ENO)

(3) Smart safety observation error occurring servo axis (SFERR_SVm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SMART SAFETY OBSER-VATION WARNING OC-CURING SPINDLE (SPINDLE)	SFWRG_SPm	ZR1044 bit0	ZR1044 bit1	ZR1044 bit2	ZR1044 bit3	ZR1044 bit4	ZR1044 bit5	ZR1044 bit6	ZR1044 bit7

[Function]

This signal shows the Spindle which the Smart safety observation warning occurred.

[Operation]

When the Smart safety observation warning for each axis is occurring, it turns ON the BIT corresponding to the Spindle that the warning occurred. It outputs 0 when Smart safety observation warning is not in occurrence state.

[Caution]

It outputs 0 when Smart safety observation warning which does not display the message of the axis name occurs.

[Related signals]

(1) V number of smart safety observation warning (SFWRG_VNO)

(2) W number of smart safety observation warning (SFWRG_WNO)

(3) Smart safety observation warning occurring servo axis (SFWRG_SVm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SLS SPEED CHANGE OUTPUT (SPINDLE)	SLSSMOmn	ZR1056	ZR1057	ZR1058	ZR1059	ZR1060	ZR1061	ZR1062	ZR1063

[Function]

This signal outputs the currently selected SLS speed tolerance's step No.

This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).

(When SLS is disabled by #51002 SLS_Enable, always zero is output to all the bits of this signal (SLS speed tolerance 1).

SLS speed change output status

SLS speed change output		No. of step to be selected	Corresponding SLS speed parameter
Bit1	Bit0		
0	0	1	#51303 SLS_SSpeed1
0	1	2	#51304 SLS_SSpeed2
1	0	3	#51305 SLS_SSpeed3
1	1	4	#51306 SLS_SSpeed4

[Operation]

When SLS speed change input (SLSSMImn) is changed, this signal is also changed.

(This signal is changed even though SLS observation request (*SLSSRm) is ON (when SLS is not requested).)

[Related signals]

(1) SLS speed change input (SLSSMImn)

(2) SLS speed override input (SLSSOVRImn)

(3) SLS speed override output (SLSSOVROmn)

(4) SLS observation request (*SLSSRm)

(5) SLS observation is active (SLSSEm)

(6) Under SLS limit (SLSSSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	SLS SPEED OVERRIDE OUTPUT (SPINDLE)	SLSSOV-ROmn	ZR1056	ZR1057	ZR1058	ZR1059	ZR1060	ZR1061	ZR1062	ZR1063

[Function]

This signal outputs the currently selected SLS speed override.

This signal is available when SLS is enabled by the parameter (#51002 SLS_Enable).

(When SLS is disabled by #51002 SLS_Enable, always zero is output to all the bits of this signal (SLS speed override 1).)

SLS speed override output status

SLS speed override input				No. of step to be selected	Corresponding SLS speed override parameter
Bit7	Bit6	Bit5	Bit4		
0	0	0	0	1	#51307 SLS_SOverride1
0	0	0	1	2	#51308 SLS_SOverride2
0	0	1	0	3	#51309 SLS_SOverride3
0	0	1	1	4	#51310 SLS_SOverride4
0	1	0	0	5	#51311 SLS_SOverride5
0	1	0	1	6	#51312 SLS_SOverride6
0	1	1	0	7	#51313 SLS_SOverride7
0	1	1	1	8	#51314 SLS_SOverride8
1	0	0	0	9	#51315 SLS_SOverride9
1	0	0	1	10	#51316 SLS_SOverride10
1	0	1	0	11	#51317 SLS_SOverride11
1	0	1	1	12	#51318 SLS_SOverride12
1	1	0	0	13	#51319 SLS_SOverride13
1	1	0	1	14	#51320 SLS_SOverride14
1	1	1	0	15	#51321 SLS_SOverride15
1	1	1	1	16	#51322 SLS_SOverride16

[Operation]

When SLS speed override input (SLSSOVRImn) is changed, this signal is also changed.

(This signal is changed even though SLS observation request (*SLSSRm) is ON (when SLS is not requested).)

[Related signals]

(1) SLS speed change input (SLSSMImn)

(2) SLS speed change output (SLSSMOmn)

(3) SLS speed override input (SLSSOVRImn)

(4) SLS observation request (*SLSSRm)

(5) SLS observation is active (SLSSEm)

(6) Under SLS limit (SLSSSm)

Con-tact	Signal name	Signal abbreviation	1st SP	2nd SP	3rd SP	4th SP	5th SP	6th SP	7th SP	8th SP
A	UNDER SSM SAFE SPEED (SPINDLE)	SSMSSmn	ZR1088	ZR1089	ZR1090	ZR1091	ZR1092	ZR1093	ZR1094	ZR1095

[Function]

This signal indicates that Safe speed monitor has been enabled on the spindle and that the spindle speed is under the safe speed.

Correspondence between Under SSM safe speed signals and parameters

Under SSM safe speed		Corresponding SSM speed parameter
bit0	Under SSM safe speed 1	#51326 SSM_SSpeed1, #51330 SSM_SHysteresis1
bit1	Under SSM safe speed 2	#51327 SSM_SSpeed2, #51331 SSM_SHysteresis2
bit2	Under SSM safe speed 3	#51328 SSM_SSpeed3, #51332 SSM_SHysteresis3
bit3	Under SSM safe speed 4	#51329 SSM_SSpeed4, #51333 SSM_SHysteresis4

[Operation]

This signal turns ON when SSM request (*SSMSRm) is turned OFF (when SSM is requested), the NC starts execution of SSM, and then the speed of the spindle drops to the safe speed or lower. This signal remains OFF while the spindle speed is exceeding the safe speed. This signal turns OFF when SSM request (*SSMSRm) is turned ON (when SSM is not requested).

[Related signals]

(1) SSM request (*SSMSRm)

(2) SSM is active (SSMSEm)

Con-tact	Signal name	Signal abbreviation	
A	IN SAFETY EXTERNAL EMERGENCY STOP (SYSTEM COMMON)	SEXTEMG	ZR1264 bit0

[Function]

This signal indicates that Safety external emergency stop is being executed.

[Operation]

This signal turns ON when Safety external emergency stop is enabled (when the emergency stop signal device No. is set in the safety I/O assignment parameter), the emergency stop signal turns OFF (open status), the axis for which the parameter SF_Disable / SF_SDisable is set to OFF enters STO status, and all the axes are set in Ready OFF status. This signal turns OFF when the emergency stop signal turns ON (close status) and both the STO status of the axis for which SF_Disable / SF_SDisable is set to OFF, and the Ready OFF status of all the axes are cancelled.

Con-tact	Signal name	Signal abbreviation	
A	V NUMBER OF SMART SAFETY OBSERVATION ERROR (SYSTEM COMMON)	SFERR_VNO	ZR1268

[Function]

This signal shows the category numbers of Smart safety observation error (V number).

[Operation]

When the Smart safety observation error occurs, it outputs the number (V number) that shows the category of the error occurred.

It outputs 0 when Smart safety observation error is not in occurrence state.

Ex.) When the Smart safety observation error “V04 0003 Safe IO disabled: connect err” occurs,

ZR1268 : 0004

[Related signals]

(1) E number of smart safety observation error (SFERR_ENO)

(2) Smart safety observation error occurring servo axis (SFERR_SVm)

(3) Smart safety observation error occurring spindle (SFERR_SPm)

Con-tact	Signal name	Signal abbreviation	
A	E NUMBER OF SMART SAFETY OBSERVATION ERROR (SYSTEM COMMON)	SFERR_ENO	ZR1269

[Function]

This signal shows the error numbers of Smart safety observation error (E number).

[Operation]

When the Smart safety observation error occurs, it outputs the number (E number) that shows which error occurred in the error category (V number).

It outputs 0 when Smart safety observation error is not in occurrence state.

Ex.) When the Smart safety observation error “V04 0003 Safe IO disabled: connect err” occurs,

ZR1269 : 0003

[Related signals]

(1) V number of smart safety observation error (SFERR_VNO)

(2) Smart safety observation error occurring servo axis (SFERR_SVm)

(3) Smart safety observation error occurring spindle (SFERR_SPm)

Con-tact	Signal name	Signal abbreviation	
A	V NUMBER OF SMART SAFETY OBSERVATION WARNING (SYSTEM COMMON)	SFWRG_VNO	ZR1270

[Function]

This signal shows the category numbers of Smart safety observation warning (V number).

[Operation]

When the Smart safety observation warning occurs, it outputs the number (V number) that shows the category of the warning occurred.

It outputs 0 when Smart safety observation warning is not in occurrence state.

Ex.) When the Smart safety observation warning “V51 0005 SBT warning 4” occurs,

ZR1270 : 0033 (51 in decimal)

[Related signals]

(1) W number of smart safety observation warning (SFWRG_WNO)

(2) Smart safety observation warning occurring servo axis (SFWRG_SVm)

(3) Smart safety observation warning occurring spindle (SFWRG_SPm)

Con-tact	Signal name	Signal abbreviation	
A	W NUMBER OF SMART SAFETY OBSERVATION WARNING (SYSTEM COMMON)	SFWRG_WNO	ZR1271

[Function]

This signal shows the warning numbers of Smart safety observation warning (W number).

[Operation]

When the Smart safety observation warning occurs, it outputs the number (W number) that shows which warning occurred in the warning category (V number).

It outputs 0 when Smart safety observation warning is not in occurrence state.

Ex.) When the Smart safety observation warning ”V51 0005 SBT warning 4” occurs,

ZR1271 : 0005

[Related signals]

(1) V number of smart safety observation warning (SFWRG_VNO)

(2) Smart safety observation warning occurring servo axis (SFWRG_SVm)

(3) Smart safety observation warning occurring spindle (SFWRG_SPm)

Con-tact	Signal name	Signal abbreviation	
A	SAFETY I/O OBSERVA-TION STATE	SIOERRSTS	ZR1536

[Function]

This signal outputs the state of safety I/O-related observation function.

Bit	Description		Bit	Description
bit0	Safety I/O unit observation error		bit8	Reserved
bit1	Drive’s safety signal compare error		bit9	Reserved
bit2	Output OFF check not complete		bit10	Reserved
bit3	Reserved		bit11	Reserved
bit4	Reserved		bit12	Reserved
bit5	Reserved		bit13	Reserved
bit6	Reserved		bit14	Reserved
bit7	Reserved		bit15	Reserved

[Operation]

When an error occurs on a safety I/O related observation function, the corresponding error information is output.

[Related signals]

(1) Safety I/O unit observation state (SIOERRUNIT)

(2) Safety I/O unit observation error details (SIOERRUNITSTS)

Con-tact	Signal name	Signal abbreviation	
A	SAFETY I/O UNIT OBSER-VATION STATE	SIOER-RUNIT	ZR1538

[Function]

This signal outputs the state of safety I/O unit observation error for each safety I/O unit.

Bit	Description		Bit	Description
bit0	Safety I/O unit Unit 1 error occurring		bit8	Reserved
bit1	Safety I/O unit Unit 2 error occurring		bit9	Reserved
bit2	Safety I/O unit Unit 3 error occurring		bit10	Reserved
bit3	Safety I/O unit Unit 4 error occurring		bit11	Reserved
bit4	Safety I/O unit Unit 5 error occurring		bit12	Reserved
bit5	Safety I/O unit Unit 6 error occurring		bit13	Reserved
bit6	Safety I/O unit Unit 7 error occurring		bit14	Reserved
bit7	Safety I/O unit Unit 8 error occurring		bit15	Reserved

For the safety I/O unit Unit 1 to 8, the devices are assigned with the parameters.

The following table lists the device assignment for the safety I/O unit Unit 1 to 8.

	Unit1	Unit2	Unit3	Unit4	Unit5	Unit6	Unit7	Unit8
Channel No.	#51501	#51511	#51521	#51531	#51541	#51551	#51561	#51571
Station No.	#51502	#51512	#51522	#51532	#51542	#51552	#51562	#51572
Input device name	#51503	#51513	#51523	#51533	#51543	#51553	#51563	#51573
Input device No.	#51504	#51514	#51524	#51534	#51544	#51554	#51564	#51574
Output device name	#51505	#51515	#51525	#51535	#51545	#51555	#51565	#51575
Output device No.	#51506	#51516	#51526	#51536	#51546	#51556	#51566	#51576

[Operation]

When an error occurs in a safety I/O unit observation function, the error information is output.

[Related signals]

(1) Safety I/O observation state (SIOERRSTS)

(2) Safety I/O unit observation error details (SIOERRUNITSTS)

Con-tact	Signal name	Signal abbreviation	Unit1	Unit2	Unit3	Unit4	Unit5	Unit6	Unit7	Unit8
A	SAFETY I/O UNIT OBSER-VATION ERROR DETAILS	SIOER-RUNITSTS	ZR1540	ZR1541	ZR1542	ZR1543	ZR1544	ZR1545	ZR1546	ZR1547

[Function]

This signal outputs details of safety I/O unit observation error for each safety I/O unit.

Bit	Description		Bit	Description
bit0	Slave station communication error 1		bit8	Host station communication error 1
bit1	Slave station communication error 2		bit9	Host station communication error 2
bit2	Slave station communication error 3		bit10	Host station communication error 3
bit3	Slave station data compare error		bit11	Output signal cross-check error
bit4	Output OFF check error		bit12	Reserved
bit5	Output return signal cross-check error		bit13	Reserved
bit6	Transmission cross-check error		bit14	Reserved
bit7	Reception cross-check error		bit15	Reserved

For the safety I/O unit Unit 1 to 8, the devices are assigned with the parameters.
The following table lists the device assignment for the safety I/O unit Unit 1 to 8.

	Unit1	Unit2	Unit3	Unit4	Unit5	Unit6	Unit7	Unit8
Channel No.	#51501	#51511	#51521	#51531	#51541	#51551	#51561	#51571
Station No.	#51502	#51512	#51522	#51532	#51542	#51552	#51562	#51572
Input device name	#51503	#51513	#51523	#51533	#51543	#51553	#51563	#51573
Input device No.	#51504	#51514	#51524	#51534	#51544	#51554	#51564	#51574
Output device name	#51505	#51515	#51525	#51535	#51545	#51555	#51565	#51575
Output device No.	#51506	#51516	#51526	#51536	#51546	#51556	#51566	#51576

[Operation]

When an error occurs in a safety I/O unit observation function, the error details are output.

[Related signals]

(1) Safety I/O observation state (SIOERRSTS)
(2) Safety I/O unit observation state (SIOERRUNIT)

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Revision History

Date of revision	Manual No.	Revision details
Apr. 2015	IB(NA)1501272-A	First edition created.
Sep. 2015	IB(NA)1501272-B	The descriptions were revised to meet the specifications of Mitsubishi CNC M800/M80 series software version A4. The Interface signals for the software version A4 were added to the following chapters. - Chapter 2 Input/Output Signals with Controller - Chapter 4 Explanation of Interface Signals Errors in writing were corrected.

M800/M80 Series Manual List

These contents are described in the presupposition that all functions of M8 Series are available.
Some functions or screens may not be available depending on the machine or specifications set by MTB. (Confirm the specifications before use.)
The manuals issued by MTB take precedence over these manuals.

Manual	IB No.	Purpose and Contents
M800/M80 Series Instruction Manual	IB-1501274	- Operation guide for NC - Explanation for screen operation, etc.
M800/M80 Series Programming Manual (Lathe System) (1/2)	IB-1501275	- G code programming for lathe system - Basic functions, etc.
M800/M80 Series Programming Manual (Lathe System) (2/2)	IB-1501276	- G code programming for lathe system - Functions for multi-part system, high-accuracy function, etc.
M800/M80 Series Programming Manual (Machining Center System) (1/2)	IB-1501277	- G code programming for machining center system - Basic functions, etc.
M800/M80 Series Programming Manual (Machining Center System) (2/2)	IB-1501278	- G code programming for machining center system - Functions for multi-part system, high-accuracy function, etc.
M800/M80 Series Alarm/Parameter Manual	IB-1501279	- Alarms - Parameters

Manuals for MTBs (NC)

Manual	IB No.	Purpose and Contents
M800/M80 Series Specifications Manual	IB-1501267	- Model selection - Specifications of hardware unit - Outline of various functions
M800W Series Connection and Setup Manual	IB-1501268	- Detailed specifications of hardware unit - Installation, connection, wiring, setup (startup/adjustment)
M800S/M80 Series Connection and Setup Manual	IB-1501269	- Detailed specifications of hardware unit - Installation, connection, wiring, setup (startup/adjustment)
M800/M80 Series PLC Development Manual	IB-1501270	- Electrical design - I/O relation (assignment, setting, connection), field network - Development environment (PLC on-board, peripheral development environment), etc.
M800/M80 Series PLC Programming Manual	IB-1501271	- Electrical design - Sequence programming - PLC support functions, etc.
M800/M80 Series PLC Interface Manual	IB-1501272	- Electrical design - Interface signals between NC and PLC

Manuals for MTBs (drive section)

Manual	IB No.	Contents
MDS-E/EH Series Specifications Manual	IB-1501226	- Specifications for power supply regeneration type
MDS-E/EH Series Instruction Manual	IB-1501229	- Instruction for power supply regeneration type
MDS-EJ/EJH Series Specifications Manual	IB-1501232	- Specifications for regenerative resistor type
MDS-EJ/EJH Series Instruction Manual	IB-1501235	- Instruction for regenerative resistor type
MDS-EM Series Specifications Manual	IB-1501238	- Specifications for multi-hybrid, power supply regeneration type
MDS-EM Series Instruction Manual	IB-1501241	- Instruction for multi-hybrid, power supply regeneration type
DATA BOOK	IB-1501252	- Specifications of servo drive unit, spindle drive unit, motor, etc.

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Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible. Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

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MODEL	M800/M80 Series
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